See Exhibit C for detailed guidance on the preparation of this attachment. There is no page limitation for Attachment 7; however, applicants are encouraged to be clear and concise.

This attachment deals with estimating and presenting the costs and benefits of water supply aspects of the Proposal. A qualitative analysis can be provided if it is not feasible to quantify the benefits and the applicant provides adequate justification. If possible, water supply benefits should be quantified either in economic terms or physical terms.

The information contained in Attachment 7 will be evaluated by DWR using the Scoring Criterion and will be used for "comparative analysis" of one grant application against another grant application and not as a means for DWR to select an individual project from within a Proposal for funding.

Note that commitment to providing the water supply benefits will become a term of the grant agreement if the Proposal is selected for funding.

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Ventura County Regional Urban Landscape Efficiency Program (R-1)

Summary

The Ventura County Regional Urban Landscape Efficiency Program (VC-RULE) is a regional partnership of nine water agencies in Ventura County focused on reducing urban landscape water use by improving irrigation efficiency. To maximize water savings, the project "bundles" landscape irrigation surveys, which assess irrigation system performance but do not lead directly to water savings, with one of three tiers of irrigation system upgrades. All landscapes that receive an irrigation survey will receive, at a minimum, minor adjustments and irrigation system reprogramming to improve water use efficiency. The second tier of properties will receive rain shut-off sensors and low-precipitation-rate irrigation nozzles, which apply irrigation water at a lower rate to allow better infiltration into the soil, reducing runoff and the total amount of water that must be applied to the landscape. Larger landscapes, for which the savings are most cost effective, will receive weather-based irrigation controllers (WBICs), which automatically adjust irrigation schedules in response to weather conditions, providing only the water needed by the landscape. This project will reduce water demand and, as a result, reduce the region's dependency on imported water sources. Table 1 provides an overview of costs and benefits presented in Attachments 7 and 8. The remainder of this attachment discusses the project costs and water supply benefits.

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Costs

The costs for VC-RULE primarily accrue from providing landscape irrigation surveys, minor irrigation system adjustments and programming, low-precipitation-rate irrigation nozzles, rain shut-off sensors, WBICs, and post-WBIC-installation customer surveys. All costs are considered implementation costs, with no post-implementation administration, operations, or maintenance costs. The project costs will be spread over an implementation period from October 2011 through May 2014, with approximately $480,000 expected to be spent in each full calendar year. The present value of costs over the project implementation period is $1,040,209.

The "Without Project" Baseline

Without VC-RULE, the participating retail water agencies will continue to provide potable water to meet the irrigation demands of the 1,091 sites for irrigation efficiency improvements. Project proponents estimate that outdoor irrigation accounts for between 44 percent and 85 percent of their total water demand, with most agencies reporting 60 percent to 70 percent.

Table 2 lists each retail agency included in VC-RULE, their marginal water source, and the relevant watershed in which they are located. Eight of the nine participating agencies rely on imported water from the State Water Project (SWP) for part of their supply. SWP water is delivered by the Calleguas Municipal Water District (Calleguas). The Casitas Municipal Water District (Casitas) is the only agency that does not serve imported SWP water. Casitas provides local surface water from Lake Casitas as both a retail and wholesale water provider. Casitas plans to include only its retail customers in the project.

Table 1: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$1,040,208
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Cost	$968,331
Avoided Local Surface Water Cost	$11,203
Total Monetized Benefits	$979,534
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Quality and Other Benefits	
Reduced Pollution from Dry-Weather Irrigation Runoff	+
Avoided Introduction of Additional Salts into Basin	+
Reduced Carbon Dioxide Emissions	+
Reduced Stress on the Bay-Delta	+
Increased Water Conservation Education	+
Reduced Street Maintenance Costs	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+	=	Likely to increase net benefits relative to quantified estimates.
++	=	Likely to increase net benefits significantly.
–	=	Likely to decrease benefits.
– –	=	Likely to decrease net benefits significantly.
U	=	Uncertain, could be + or –.

Table 2: VC-RULE Water Agencies, Water Source, and Watershed

Utility Name	Marginal Water Source	Major Watersheds
Camrosa Water District	State Water Project	Calleguas Creek
Casitas Municipal Water District	Local Surface Water	Ventura River
City of Camarillo Water Division	State Water Project	Calleguas Creek
City of Oxnard	State Water Project	Calleguas Creek, Santa Clara River, Channel Islands
City of Simi Valley/ County Waterworks District No. 8	State Water Project	Calleguas Creek
Ventura County Waterworks District No. 1	State Water Project	Calleguas Creek
Ventura County Waterworks District No. 17	State Water Project	Calleguas Creek
Ventura County Waterworks District No. 19	State Water Project	Calleguas Creek
Lake Sherwood Community Services District	State Water Project	Santa Monica Bay

Water Supply Benefits

By improving irrigation efficiency and conserving water, this project will reduce water demand, reduce the region’s dependency on imported water sources, and increase Ventura County’s water supply reliability. SWP water is the marginal water supply for eight of the nine participating agencies. Thus, a majority of the water savings translates into avoided SWP water usage.

Avoided Water Supply Cost

Over the life of VC-RULE, 1,091 landscapes will be targeted by nine water agencies in Ventura County for irrigation efficiency improvements.

All landscapes will receive an irrigation survey and minor adjustments and reprogramming if necessary. Larger landscapes will be targeted for installation of WBICs and low-precipitation-rate nozzles; smaller landscapes will be targeted for installation of rain shut-off sensors and low-precipitation-rate nozzles. The different levels of actions and the bundling of landscape irrigation surveys with irrigation system improvements are designed to maximize the project's cost effectiveness and to guarantee a greater amount of actual water savings than would be obtained with separate survey, rebate, and/or direct installation programs.

Participating agencies examined billing records to develop a priority list of landscapes for treatment under this project. Because the surveys and irrigation improvements will be provided free of charge, it is anticipated that most identified landscapes will participate in the program. If they do not participate, resources can be easily redirected to other landscapes with a high potential for irrigation efficiency upgrades.

To calculate the amount of water to be saved, six categories were considered. The categories include three possible treatments for landscapes larger than 1 acre and three possible treatments for landscapes smaller than 1 acre. Because analysis conducted in Oxnard showed that the installation of WBICs is only cost effective for lot sizes greater than 1 acre (A&N Technical Services, 2010), only large lots will receive a WBIC system under this project. The following fractional shares (in parentheses) for each type of landscape irrigation treatment were derived based on experience implementing a similar program in the Three Valleys Water District (Three Valleys Municipal Water District, 2010).

For landscapes larger than 1 acre:

- Installation of WBIC system and low-precipitation-rate nozzles (0.5)
- Installation of WBIC system only (0.3)
- Adjustment and reprogramming of existing irrigation system only (0.2)

For landscapes smaller than 1 acre:

- Installation of rain shut-off sensors and low-precipitation-rate nozzles (0.5)
- Installation of low-precipitation-rate nozzles only (0.3)
- Adjustment and reprogramming of existing irrigation system only (0.2)

WBIC systems are expected to provide water savings of 0.0325 acre-feet per year (AFY) over a 10-year expected lifetime (A&N Technical Services, 2010). The average size of large landscapes (7.15 acres) was calculated by averaging the size of the 90 large landscapes anticipated for treatment by the City of Oxnard. This average lot size was applied to all agencies in the program after spot-checking the size of landscapes serviced by other water agencies, which was found to be generally consistent with the average large landscape lot size in Oxnard.

Low-precipitation-rate nozzles conserve 0.004 AFY/nozzle over a 5-year lifetime (A&N Technical Services, 2010). After an informal survey of the installation practices of other water agencies serviced by the Metropolitan Water District of Southern California (Metropolitan), it was determined that the average number of nozzles per landscape is 40 for landscapes larger than 1 acre and 25 for landscapes smaller than 1 acre.

Rain shut-off sensors are assumed to conserve 0.0338 AFY, based on analysis cited in the City of Santa Barbara Rain Sensor grant application (City of Santa Barbara, 2007). These rain sensors are assumed to have a 10-year lifetime.

Water conservation based on landscape irrigation surveys combined with system adjustments and reprogramming was determined by using the Alliance for Water Efficiency (AWE) Conservation Tracking Tool (AWE, 2010). For landscapes larger than 1 acre, the savings are expected to be 0.568 AFY. For landscapes smaller than 1 acre, the savings is estimated to be 0.0378 AFY.

Each water agency reported the number of large and small landscapes they anticipated treating under this program. This breakdown is shown in Table 3, which also reports the estimated water savings by water agency over the project lifetime.

The avoided cost of the marginal water source was used to monetize the water savings listed in Table 3. One participating water agency – Casitas – uses primarily local surface water from Lake Casitas, for which the cost of production, including treatment and pumping, was $521 per acre-foot in 2007 (Casitas Municipal Water District, 2007). These costs were escalated from 2007 dollars to 2009 dollars and the assumption made that this cost will rise at the rate of inflation after 2009, thus remaining constant in real dollars.

Savings from all other participating agencies will offset imported SWP water purchases from Calleguas, which delivers an average mix of 90 percent Tier 1 and 10 percent Tier 2 allotment from Metropolitan. For Calleguas, an average 2011 water rate of $946 per acre-foot was derived using the weighted shares of the rate charged by Calleguas for Tier 1 and Tier 2 water. Calleguas expects rate increases of 6 percent per year into the future in nominal terms. Metropolitan reports that 3.5 percent of its projected rate increases over the next 10 years will derive from expected inflation. Thus, a 2.5 percent real rate of increase was used for future Calleguas supplies.

Table 3: Anticipated Landscapes Greater than and Less than 1 Acre and Estimated Water Savings, by Agency

Water Agency	Anticipated > 1 acre Landscapes	Anticipated < 1 acre Landscapes	Estimated Water Savings Over Project Lifetime (AF)
Camrosa Water District	30	30	103.2
Casitas Municipal Water District	11	0	31.1
City of Camarillo Water Division	51	180	254.6
City of Oxnard	90	495	558.1
City of Simi Valley/ County Waterworks District No. 8	60	0	169.6
Ventura County Waterworks District No. 1	28	22	92.9
Ventura County Waterworks District No. 17	28	22	92.9
Ventura County Waterworks District No. 19	12	10	39.8
Lake Sherwood Community Services District	12	10	39.8
Project Total	**322**	**769**	**1382**

AF = acre-feet

From project implementation in 2011 until the end of the anticipated lifetime of the longest-lived installed water savings devices in 2023, 1,382 AF of water will be saved, with an avoided cost of $979,534 in present-value 2009 dollars. A majority of the total avoided water cost will be for avoided imported SWP supplies. The present value of avoided SWP water cost over the life of the project will total $968,331 in 2009 dollars, resulting from a total water savings over the life of the project of 1,351 AF. The present value of avoided local surface water use by Casitas will total $11,203, resulting from a total water savings over the life of the project of 31 AF.

Distribution of Project Benefits and Identification of Beneficiaries

Nine water agencies representing Ventura County's three main watersheds have partnered to establish this water use efficiency program. The majority of benefits will accrue to these nine agencies and their customers. However, reduced demand for water imported from the SWP will have benefits for the sensitive ecosystems in the San Francisco Bay-Delta. Additionally, the regional wholesaler of SWP water, Calleguas, may experience greater flexibility in partitioning a limited resource within its service area. Table 4 shows a breakdown of project beneficiaries.

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Table 4: Project Beneficiaries Summary

Local	Regional	Statewide
Camrosa Water District	Calleguas Municipal Water District	San Francisco Bay-Delta
Casitas Municipal Water District	Metropolitan Water District of Southern California	
City of Camarillo Water Division		
City of Oxnard		
City of Simi Valley/ County Waterworks District No. 8		
Ventura County Waterworks District No. 1		
Ventura County Waterworks District No. 17		
Ventura County Waterworks District No. 19		
Lake Sherwood Community Services District		

Project Benefits Timeline

VC-RULE will be implemented over a 32-month period from the beginning of October 2011 through the end of May 2014. WBICs and rain shut-off sensors are expected to have an average lifetime of 10 years, which is the longest device lifetime used in this project. Project benefits are expected to extend over 13 years, which allows phase-in of implementation over the first three years and phase-out of benefits at the end of the project. However, some of the water efficiency upgrades planned for this project have shorter lifetimes. For example, the benefits that accrue from landscape irrigation surveys/adjustments/ reprogramming and low-precipitation rate nozzles are anticipated to last for 5 years. The appropriate lifetime is applied to each water efficiency measure in order to calculate benefits for VC-RULE.

To calculate water savings by year, it was assumed that the project will be implemented across the timeframe from October 2011 through May 2014. This results in a ramp-up period for water savings where 3/32 of project benefits are realized in 2011, 15/32 are realized in 2012, 27/32 in 2013, and all benefits realized in 2014. Due to the 5-year lifetime assumed for landscape irrigation surveys/adjustments/ reprogramming and low-precipitation rate nozzles, benefits ramp down between 2016 and 2018, after which only benefits from WBICs and rain sensors continue to accrue. Then these benefits ramp down from 2021 through 2023, based on a 10-year lifetime for WBICs and rain sensors.

Potential Adverse Effects from the Project

VC-RULE is categorically exempt under the California Environmental Quality Act (CEQA) under CEQA Guidelines, Section 15061 (b) (3 Therefore, no adverse effects are anticipated from this project.

Summary of Findings

The monetized benefit of VC-RULE is the avoided cost of importing water supplies for most participating water agencies and the avoided costs of supplying local surface water for Casitas. The cost of treated SWP water delivered by Calleguas in 2011 is $946 in 2009 dollars. The cost of imported supplies delivered by Calleguas is expected to increase at a long-term real rate of 2.5 percent per year. The cost of supplying local surface water from Casitas in 2011 is $542 in 2009 dollars. The cost of these supplies was assumed to remain constant in real dollars. The avoided cost of all avoided water supplies totals $979,534 in 2009 dollars over the life of the project, with $968,331 of that cost coming from avoided imported water supplies.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with assumptions of the average size of large landscapes, the average number of low-precipitation-rate nozzles installed per small and large landscape, and the fraction of each landscape type that receives each type of landscape treatment. Although each assumption was based on data from participating water agencies or the experience of similar water agencies in Southern California, the actual values could differ from these assumptions. Assumptions were also made about the lifetime of benefits associated with low-precipitation-rate nozzles, landscape irrigation surveys/adjustments/reprogramming, WBIC systems, and rain shut-off sensors. These issues are listed in Table 5.

Table 5: Omissions, Biases, and Uncertainties and Their Effects on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Avoided Water Supply Cost – Water Savings Estimates	U	Estimates of water savings based on assumptions regarding average size of large landscapes, average number of low-precipitation-rate nozzles installed per small and large landscape, fraction of each landscape type that receives each type of landscape treatment.
Avoided Water Supply Cost – Lifetime of Nozzles and Landscape Irrigation Surveys/Adjustments/Reprogramming	+	Longer lifetimes are possible for nozzles and landscape irrigation surveys/adjustments/reprogramming, compared to the 5 years assumed in this analysis. Longer lifetimes would yield greater water savings than estimated here.
Avoided Water Supply Cost – Lifetime of WBIC and Rain Sensors	+	Lifetime of WBIC systems and rain sensors is assumed to be 10 years. A review of the marketplace showed that WBIC lifetime could be 15 years (U.S. EPA, 2009). If the longer WBIC lifetime applies, then savings associated with the WBIC component of the project could be greater than shown here.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

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Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project: Ventura County Regional Urban Landscape Efficiency Program (R-1)									
	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009	$0						$0	1.000	$0
2010	$0						$0	0.943	$0
2011	$120,074						$120,074	0.890	$106,866
2012	$480,300						$480,300	0.840	$403,452
2013	$480,300						$480,300	0.792	$380,398
2014	$200,124						$200,124	0.747	$149,493
Project Life									
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$1,040,208
Comments: The project is assumed to be implemented evenly over the time period between October 2011 and May 2014. Total annual costs are proportional to the number of months in each calendar year divided by the total number of project months multipled by the total project costs.									

(1) The incremental change in O&M costs attributable to the project.

Table 12 - Annual Water Supply Benefits (All benefits should be in 2009 dollars) Project: Ventura County Regional Urban Landscape Efficiency Program (R-1)									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009	Avoided local surface water - Casitas	acre feet	0	0.00	0.00	$542	$0	1.000	$0
	Avoided imported water - Other agencies	acre feet	0	0.00	0.00	$781	$0	1.000	$0
2010	Avoided local surface water - Casitas	acre feet	0	0.00	0.00	$542	$0	0.943	$0
	Avoided imported water - Other agencies	acre feet	0	0.00	0.00	$923	$0	0.943	$0
2011	Avoided local surface water - Casitas	acre feet	0	0.39	0.39	$542	$212	0.890	$189
	Avoided imported water - Other agencies	acre feet	0	18.69	18.69	$946	$17,676	0.890	$15,732
2012	Avoided local surface water - Casitas	acre feet	0	1.96	1.96	$542	$1,060	0.84	$891
	Avoided imported water - Other agencies	acre feet	0	93.46	93.46	$969	$90,589	0.84	$76,095
2013	Avoided local surface water - Casitas	acre feet	0	3.52	3.52	$542	$1,908	0.792	$1,512
	Avoided imported water - Other agencies	acre feet	0	168.23	168.23	$994	$167,137	0.792	$132,373
2014	Avoided local surface water - Casitas	acre feet	0	4.17	4.17	$542	$2,262	0.747	$1,690
	Avoided imported water - Other agencies	acre feet	0	199.38	199.38	$1,018	$203,041	0.747	$151,672
2015	Avoided local surface water - Casitas	acre feet	0	4.17	4.17	$542	$2,262	0.705	$1,595
	Avoided imported water - Other agencies	acre feet	0	199.38	199.38	$1,044	$208,117	0.705	$146,723
2016	Avoided local surface water - Casitas	acre feet	0	3.97	3.97	$542	$2,154	0.665	$1,432
	Avoided imported water - Other agencies	acre feet	0	187.33	187.33	$1,070	$200,424	0.665	$133,282
2017	Avoided local surface water - Casitas	acre feet	0	3.18	3.18	$542	$1,721	0.627	$1,079
	Avoided imported water - Other agencies	acre feet	0	139.12	139.12	$1,097	$152,560	0.627	$95,655
2018	Avoided local surface water - Casitas	acre feet	0	2.38	2.38	$542	$1,288	0.592	$763
	Avoided imported water - Other agencies	acre feet	0	90.90	90.90	$1,124	$102,177	0.592	$60,489
2019	Avoided local surface water - Casitas	acre feet	0	2.04	2.04	$542	$1,108	0.558	$618
	Avoided imported water - Other agencies	acre feet	0	70.81	70.81	$1,152	$81,585	0.558	$45,525
2020	Avoided local surface water - Casitas	acre feet	0	2.04	2.04	$542	$1,108	0.527	$584
	Avoided imported water - Other agencies	acre feet	0	70.81	70.81	$1,181	$83,625	0.527	$44,070
2021	Avoided local surface water - Casitas	acre feet	0	1.85	1.85	$542	$1,004	0.497	$499
	Avoided imported water - Other agencies	acre feet	0	64.17	64.17	$1,210	$77,680	0.497	$38,607
2022	Avoided local surface water - Casitas	acre feet	0	1.09	1.09	$542	$589	0.469	$276
	Avoided imported water - Other agencies	acre feet	0	37.62	37.62	$1,241	$46,675	0.469	$21,890
2023	Avoided local surface water - Casitas	acre feet	0	0.32	0.32	$542	$173	0.442	$77
	Avoided imported water - Other agencies	acre feet	0	11.06	11.06	$1,272	$14,071	0.442	$6,219
Project Life	Avoided local surface water - Casitas	acre feet	0	31.10	31.10				
Project Life	Avoided imported water - Other agencies	acre feet	0	1350.98	1350.98				
Project Life	Avoided total water use - total	acre feet	0	1382.08	1382.08				
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$979,534

Notes: Table 12 - Annual Water Supply Benefits

Comments: This project provides water conservation benefits that can be monetized by calculating the number of acre feet of water saved per year and multiplying that by the cost of the water. To determine the cost of water, we accounted for two water sources. One participating water agency – the Casitas Municipal Water District – uses only surface water which cost $521 per af in 2007. We escalated those costs from 2007 to 2009 dollars by multiplying $521 per af by 1.04. We then used that same cost for every year into the future, assuming that their costs rise at the rate of inflation. Savings from all other participating agencies would offset imported State Water Project water purchases from the Calleguas Municipal Water District. This water rate was built up assuming a long-term real increase in prices of 2.5%.

To calculate the amount of water saved, six categories of project activities were divided into >1 acre treatments and < 1 acre treatments. Within each category, the following fractional shares (in parentheses) received each type of landscape irrigation treatment (based on the results of similar programs).

* >1 acre, installation of WBIC system and low precipitation rate nozzles (0.5)
* >1 acre, installation of WBIC system only (0.3)
* >1 acre, repair and reprogramming of existing irrigation system only (0.2)
* <1 acre, installation of rain shut-off sensors and low precip. rate nozzles (0.5)
* <1 acre, installation of low precipitation rate nozzles only (0.3)
* <1 acre, repair and reprogramming of existing irrigation system only (0.2)

WBIC systems were expected to provide water savings of 0.0325 af/ac/yr over a 10 year lifetime. The average size of large landscapes (7.15 acres) was calculated by averaging the size of the 90 large landscapes anticipated for treatment by the City of Oxnard. This calculation was spot checked with the landscapes serviced by other water agencies, and the number was broadly consistent across agencies. Low precipitation rate nozzles conserve 0.004 af/yr/nozzle over a five year lifetime. B surveying the installation practices of other water agencies serviced by the Metropolitan Water District of Southern California, it was determined that the average number of nozzles per landscape averaged 40 for over one acre landscapes and 25 for under one acre landscapes. Rain shut off sensors conserve 0.0338 af/yr and have a 10 year lifetime. Water conservation from landscape irrigation surveys combined with system repairs and reprogramming was determined by using the Alliance for Water Efficiency Conservation Tracking Tool. For landscapes over one acre, the savings amount to 0.568 af/yr. For landscapes under one acre, the savings amount to 0.0378 af/yr.

Finally, each water agency reported the number of large and small landscapes they anticipated treating under this program as indicated below (Water agency Anticipated >1 acre landscape treatments; Anticipated <1 acre landscape treatments):

Camrosa Water District; 30; 30
Casitas Municipal Water District; 11; 0
City of Camarillo Water Division; 51; 180
City of Oxnard; 90; 495
City of Simi Valley/Waterworks District No. 8; 60; 0
Ventura County Waterworks Districts No. 1; 28; 22
Ventura County Waterworks Districts No. 17; 28; 22
Ventura County Waterworks Districts No. 19; 12; 10
Lake Sherwood Community Services District; 12; 10

Using all of these numbers, the amount of savings per year was calculated assuming the program is implemented evenly over time and go offline based on a 5 or 10 year lifetime, depending on the efficiency improvement.

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project: Ventura County Regional Urban Landscape Efficiency Program (R-1)			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$979,534	$0	$0	$979,534
Comments: From total in Table 12			

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Calleguas Regional Salinity Management Pipeline, Phase 2A (C-14)

Summary

To address increasing salinity levels, including compliance with Total Maximum Daily Loads (TMDL), and water supply issues in the Calleguas Creek Watershed (Watershed), the Calleguas Municipal Water District (Calleguas) is developing the Calleguas Regional Salinity Management Pipeline (SMP). The SMP is a 32-mile-long pipeline system that will convey concentrate from local brackish groundwater desalters and excess recycled water from municipal wastewater treatment plants (WWTPs) to different areas in the Watershed for direct use (e.g., for agricultural and environmental purposes). When pipeline flows (both concentrate and excess recycled water) cannot be used downstream, the flows will be discharged into the Pacific Ocean through the Hueneme Outfall. To date, approximately 7 miles of the SMP have been completed under Phase 1 of project implementation with an additional 2 miles to be completed by the end of 2011. Funding is currently being sought under this proposal for Phase 2A, which includes the construction of 12,000 linear feet (about 2.25 miles) of 30-inch-diameter pipe.

The primary source of discharge to the SMP will be a series of brackish groundwater desalters. Together, the desalters will produce approximately 46,000 acre-feet per year (AFY) of desalted groundwater for municipal, industrial, and agricultural uses, thereby reducing demand for water imported from the Bay-Delta region through the State Water Project (SWP). It is anticipated that one or more agricultural desalters, which will provide 5,767 AF of water per year for irrigation purposes, will be connected to Phase 2A in the future. Future phases of the project will extend the pipeline further into the Watershed, enabling the connection of an estimated six or more additional desalters.

In addition to the desalters, several municipal WWTPs will also be connected to the SMP. The WWTPs will discharge highly-treated wastewater effluent (i.e., recycled water) during times of the year when the supply of recycled water exceeds demand in the local area. The CamSan/Camrosa Recycled Water Interconnection Pipeline (RW Interconnection) (C-15), another project included in this Proposal, is the first recycled water system that plans to discharge to the SMP. At full implementation, the RW Interconnection will discharge approximately 5.4 million gallons of recycled water to the SMP on an estimated 30 days of the year, discharging a total of 500 AFY. The number of WWTPs (and associated amount of recycled water) that will ultimately discharge to the SMP is currently unknown.

A summary of all benefits and costs of the project is provided in Table 6. Project costs and water supply benefits are discussed in the remainder of this attachment.

Table 6: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$12,975,417
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Supply Costs	$21,173,300
Total Monetizable Benefits	$21,173,300
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Local Water Supply Reliability for Calleguas Customers	++
Improved Operational Flexibility for Calleguas and Metropolitan	+
Water Quality and Other Benefits	
Salt Removal and Avoided Introduction of Salts into the Watershed	++
Improved Groundwater Quality	++
Reduced Carbon Dioxide Emissions	++
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+
Increased Ecological Value at Ventura County Game Preserve	+
Increased Recreation Value at Ventura County Game Preserve	+
Agricultural Benefits	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Costs

The capital costs for Phase 2A of the SMP amount to $15,000,000 in 2009 dollars. These costs cover construction of the pipeline, including cost for pipeline easements. O&M costs for the SMP amount to $3,289 per mile of pipeline (including periodic replacement costs). For Phase 2A, which is just over 2 miles of pipeline, annual O&M costs will average about $7,475 per year. Over the 37-year project life,[1] the sum of present value capital and O&M costs will amount to $12,975,417.

[1] The SMP's useful project life will likely be more than 50 years. However, the useful life of the desalters discharging to the SMP is only 30 years. Because the SMP cannot provide benefits without the desalters, benefits and costs associated with the SMP are calculated through 2049, the last year of the useful life of the last desalter brought online.

The "Without Project" Baseline

In recent years, Calleguas has imported up to 130,000 AFY from the SWP via the Metropolitan Water District of Southern California (Metropolitan). Calleguas distributes this water on a wholesale basis to 20 local purveyors in Ventura County, which in turn deliver water to area residents, businesses, and agricultural customers. There are currently about 615,000 people within the Calleguas' service area. By 2030, the service area population is expected to increase to more than 700,000 (Calleguas, 2005).

Currently, about 25 percent (or 44,000 AFY) of the Calleguas' service area demand is met through local groundwater sources. Although some aquifers within Ventura County contain high-quality water that needs little or no treatment prior to being delivered to the potable distribution system, these aquifers are being pumped at, near, or beyond practical sustainable yield. Most other sources of groundwater in the Watershed contain prohibitively high total dissolved solids levels. Therefore, increasing the production of local supplies for potable use will require advanced treatment technology such as reverse osmosis, which requires concentrate management and disposal.

Calleguas and the local retailers recognize that a viable alternative to imported water will be needed to improve water supply reliability. The availability of imported water is subject to a number of natural and human forces and has become increasingly vulnerable to drought, catastrophic levee failures from flood and/or seismic events, and regulatory shut downs of pumping facilities to protect endangered species. The SWP Delivery Reliability Report from 2009 indicates that environmental water needs and climate change will result in a range of deliveries from 7 percent to 81 percent of the maximum contract amount over an 82-year simulation period under current conditions. Deliveries are expected to average 60 percent of maximum contract amount under current conditions, but decrease to approximately 35 percent of maximum contract amount over multiple dry years and increase to approximately 70 percent during multiple wet years. Deliveries under future conditions are similar. Therefore, SWP contractors, such as Metropolitan, cannot rely on the SWP for delivery of maximum contract amounts, now or in the future, which compels agencies dependent upon the SWP to pursue local water supply projects. Reduced demand for imported water will increase water supply reliability within the Calleguas service area.

Without the SMP, local water suppliers could not construct brackish groundwater desalters, as there will be no cost-effective mechanism for concentrate disposal. Underutilized groundwater supplies will remain unused, and dependence on imported water supplies will increase. Thus, without this project, water supply reliability within the Calleguas service area will decrease.

Water Supply Benefits

This section describes the water supply benefits generated by the SMP, including avoided imported water supply costs to local water suppliers, improved water supply reliability for Calleguas customers, and improved operational flexibility for Calleguas and Metropolitan.

Avoided Imported Water Supply Costs to Local Water Suppliers

The following discussion presents the avoided imported water supply costs associated with the SMP. First, the methodology used to allocate the value of this benefit across SMP-related projects (i.e., the desalters and the pipeline itself) is presented.

Local Desalters and the SMP: Integration of Projects and Project Benefits

The SMP cannot provide water supply benefits without the development of brackish groundwater desalters for which the SMP will dispose of concentrate from the treatment process. The SMP and the desalters are each “necessary” for generating benefits, but neither is “sufficient” on its own to generate benefits. This raises the issue of how to apportion the benefits of the “joint SMP product” across the various necessary inputs (i.e., the SMP and desalters).

For this analysis, it is assumed that the water supply benefits of the SMP project components are proportional to the costs of each component. For example, if a single component (e.g., one desalter or the pipeline itself) accounts for 20 percent of the total combined costs, then it is assumed that 20 percent of the total joint benefits also can be attributed to that component.

The total cost of the suite of SMP projects is equal to the sum of the cost of the individual desalters plus the cost of the SMP.[2] Currently, an estimated 11 desalters are slated to make use of the SMP, including the Round Mountain Desalter, Port Hueneme Water Agency's Brackish Water Reclamation Demonstration Facility (PHWA BWRDF); Camrosa, Santa Rosa Valley, Somis, Moorpark, Simi Valley, Tapo Canyon, and Golden State desalters; and two desalters that will be used for agricultural irrigation.

The PHWA BWRDF has been completed and will be connected to the lower portion of the SMP (which has also been constructed). For the purposes of allocating benefits, the cost of the PHWA BWRDF is therefore not included in the total cost of the suite of SMP projects because it is a sunk cost, and it is not dependent on future SMP components to generate benefits. The lower portion of the SMP (including the Hueneme Outfall and the pipe necessary to deliver flows to the outfall) is also not included in the total cost of the suite of SMP projects. This portion of the SMP is also considered a sunk cost.

For the desalters, cost information is only available for the Camrosa Round Mountain Desalter. Thus, this desalter is used as a representative case to proportionally scale benefits and costs for the other anticipated desalters. That is, costs (and therefore benefits) from the eight future desalters (the ones listed above minus PHWA BWRDF, Round Mountain Desalter, and an agricultural desalter) are scaled according to water yield in comparison with water yield of the Round Mountain Desalter.

The present value capital and O&M costs for the SMP and the desalters (excluding the PHWA BWRDF and the lower portion of the SMP) are summarized in Table 7. As shown, the total cost of all SMP-related projects includes the cost of the pipe for Phase 2A of the SMP (which is the phase being submitted for funding as part of this Proposal), as well as for pipe constructed in Phases 2B through 2F, and Phase 3. In addition, a total of nine other desalters (the ones listed above minus PHWA BWRDF and an agricultural desalters) are expected to be added between 2013 and approximately 2020. The present value cost of the SMP Phase 2A amounts to about $13.0 million, or 2.7 percent of the total present value of all SMP-related project costs. Therefore, it is assumed that at full implementation of all SMP-related projects, 2.7 percent of the annual avoided imported water supply benefits can be attributed to the Phase 2A pipeline itself.[3]

The allocation of water supply benefits across the various components of the SMP applies only to the benefits associated with avoided imported water, rather than to benefits that are specific to a given project. For example, as discussed in Attachment 7 for the Round Mountain Desalter, the Round Mountain Desalter will avoid construction of a second water pipeline to supply California State University Channel Islands. For this analysis, the benefit of this avoided cost is attributable to the Round Mountain Desalter only and is not counted in the analysis of benefits associated with the SMP.

[2] For this analysis, the CamSan/Camrosa RW Interconnection, which will discharge 500 AFY of excess recycled water to the SMP, is not included in the total cost of SMP-related projects. Due to the relatively small amount of water that the Interconnection will discharge into the SMP, only a very small portion (1 percent) of the project's water supply benefits are attributable to the SMP. To simplify the overall analysis, the water supply benefits of the RW Interconnection are not allocated between the SMP and the RW Interconnection. All of the RW Interconnection's water supply benefits are reflected in Attachment 7 for the RW Interconnection.

[3] In years prior to full implementation of all desalters, benefits are scaled to reflect the percentage of total project costs up to that point. Thus, in earlier years of the project (2013–2019), before all the desalters are brought online, the Round Mountain Desalter will account for a higher percentage of total costs. In later years, after the desalter's useful life (2042), benefits will continue to accrue through the remaining desalters' useful project lives (2049). The Round Mountain Desalter will account for 0 percent of total project benefits in these years.

Table 7: Present Value Capital and O&M Costs for SMP Project Components

SMP Project Component	Present Value Cost	Percent of Total Cost
SMP (Phase 2A)	$12,975,417	2.7
SMP (Phase 2B-2F, and Phase 3)	$77,259,139	16.2
SMP Desalters	$387,835,740	81.1
Total	$478,070,296	100.0

Monetized Benefit of Avoided Imported Water

To calculate the avoided cost of imported water purchases attributable to the suite of SMP projects over time, the amount of imported water offset from the desalters each year (starting in 2013 when the Round Mountain Desalter comes online) is multiplied by the estimated rate charged, at that time, to local water suppliers by Calleguas. A portion of this benefit is then allocated to the SMP based on the percentage of total project costs, as detailed above.

To estimate future Calleguas water rates for local suppliers, it is assumed that Calleguas will continue to deliver a combination of 90 percent Tier 1 water from Metropolitan (which sells wholesale water to Calleguas for distribution to various entities in Ventura County) and 10 percent Tier 2 water (which is charged at a higher rate). When combined with Calleguas capital improvements and O&M charges, Calleguas' average water rate currently amounts to $923 per AF in 2009 dollars. Based on historical water rates, it was assumed that Calleguas' water rates will increase each year (throughout the SMP project life) at a real rate of 2.5 percent. This increase reflects investments made by Metropolitan to maintain and improve physical and natural capital assets (i.e., to enhance Metropolitan's infrastructure and water portfolio, respectively).

Based on the timeline of each desalter (assuming a useful project life of 30 years) and the estimated increase in Calleguas water rates, the total present value benefits associated with avoided imported water use for all the SMP projects amounts to more than $640 million, through 2049. The last series of desalters will come online in 2020 and will have a useful project life of 30 years (through 2049). Therefore, benefits for the SMP are calculated beginning in 2013 (when the Phase 2A desalters come online) through 2049. Based on this timeline, total present value benefits of avoided use of imported water attributable to the SMP amount to $21.2 million.

Increased Local Water Supply Reliability for Camrosa and Other Agency Customers

The reliability of a water supply refers to the ability to consistently meet water demands, even in times of drought or other constraints on source water availability. The SMP will help address reliability issues for retail agencies that depend on Calleguas to deliver that imported water. Calleguas' connection to Metropolitan is limited during peak demand periods by its current capacity. In addition, the availability of imported water is subject to climatic changes (i.e., drought) and other unforeseen events, such as earthquakes and floods.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns over climate-related events), only a few studies have directly attempted to quantify its value (i.e., through nonmarket valuation studies). The results from these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly. Stated preference studies find that water customers are willing to pay $95 to $500 per household per year for total reliability (i.e., a 0 percent probability of their water supply being interrupted in times of drought).

In determining a value of increased reliability as a result of the SMP, the challenge is to reasonably interpret these survey-based household monetary values. The values noted above reflect a willingness to pay per household to ensure complete reliability (zero drought-related use restrictions in the future), whereas the SMP through its associated desalters only enhances overall reliability but does not guarantee 100 percent reliability. Thus, if applied directly to the number of households within the Calleguas service area, the dollar values from the studies would overstate the reliability value provided by the project.

Attachment 7 for the Round Mountain Desalter describes a simple way to roughly adjust for this "whole versus part" problem. The first step is to attribute a portion of the total value of reliability to the portion of the problem that is solved by SMP-related projects. To adjust for the partial improvement in reliability from the Round Mountain Desalter, it is assumed that household willingness to pay for improved reliability is directly proportional to the amount of water produced at the plant as a percentage of the total potable water supply. This represents the percentage of total supply that has been improved in terms of overall reliability (i.e., by offsetting imported water demand with local sources).

For example, the Round Mountain Desalter will produce 1,120 AFY beginning in 2013. In that year, total Camrosa Water District (Camrosa) potable water demand is expected to amount to about 12,000 AF. Thus, 9.3 percent of total potable demand will be met by water produced at the Round Mountain Desalter. To obtain a lower bound estimate for the value of improved reliability associated with this water, it is assumed that households within the Camrosa service area are willing to pay about $8.80 per year ($95 multiplied by 9.3 percent). Applying this dollar value per household to the approximately 12,000 households within the Camrosa service area will result in $105,600 of benefits in 2013.

To determine the portion of reliability benefits attributable to the SMP, the annual benefits of improved reliability associated with each desalter would need to be calculated. This calculation would need to take into account the projected changes in local supply and demand into the future and the amount of imported water supply that the desalters will avoid each year. Benefits could then be allocated based on the percentage of costs of each SMP project component, as detailed above.

Due to the uncertainty involved in applying these numbers to this situation, this benefit estimate is not included in the tables. However, it is provided here to give an idea of the potential magnitude of this benefit.

Improved Operational Flexibility for Calleguas and Metropolitan

As a result of the SMP, at full implementation, the brackish groundwater desalters (excluding the PHWA BWRDF) will offset 46,650 AFY of imported SWP water. This will help both Calleguas and Metropolitan directly in their supply operations, allowing for longer shutdowns, deferring capital improvements, and improving reliability in a vulnerable part of the system. The value of this increased operational flexibility is not monetized in the benefits tables.

Distribution of Project Benefits and Identification of Beneficiaries

The SMP includes the full range of types of beneficiaries, as is summarized in Table 8. At the local level, cities and agencies with brackish groundwater desalters will benefit due to increased reliability of supply and by avoiding costs associated with importing additional SWP water. Regionally, those dependent on supplies from Calleguas will benefit from reduced demand on Calleguas facilities. The project will also provide statewide water supply benefits by reducing demands on water supplies from the Bay-Delta region.

Table 8: Project Beneficiaries Summary

Local	Regional	Statewide
Retail Water Agencies Supplied by Calleguas Agricultural Desalter Users Municipal/Industrial Desalter Operators	Calleguas Municipal Water District Metropolitan Water District of Southern California	San Francisco Bay-Delta

Project Benefits Timeline Description

Phase 2A is scheduled to be completed in 2013. As noted above, the present value benefits of the SMP are calculated through 2049 (the end of the 30-year useful life of the last desalter brought online). Although the SMP likely has a useful life of more than 50 years and will continue to provide benefits past 2049 (assuming the desalters are maintained/rebuilt after their 30-year project life), for this analysis, the useful life of the SMP is assumed to match the useful life of the SMP desalters (without which the SMP will not provide benefits).

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, Calleguas has prepared a draft Initial Study (IS) for the project. Based on findings from the IS, it was determined that Phase 2A of the SMP will result in no significant adverse environmental effects. A Negative Declaration was subsequently prepared and certified by Calleguas as the lead agency.

Summary of Findings

The monetized benefits from the project include the avoided cost of imported SWP supplies to local water suppliers. In 2011, the cost of treated SWP water delivered by Calleguas to its local purveyors will be $946 per AF in 2009 dollars. This cost is expected to increase at a long-term real rate of 2.5 percent per year. Through 2049 (the end of the useful life of the last SMP desalter brought online), the avoided water supply costs associated with Phase 2A of the SMP total $21,173,300 in present value in 2009 dollars.

Additionally, as a result of the SMP, cities and agencies with brackish groundwater desalters will benefit due to increased reliability of supply. Calleguas and Metropolitan will benefit from improved operational flexibility due to reduced demand on imported water. The project will also provide statewide water supply benefits by reducing demands on water supplies from the Bay-Delta region.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In most cases, omissions lead to a downward bias in benefits: the SMP is expected to be much more beneficial than the subset of benefits that can be monetized indicates. These issues are listed in Table 9.

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Table 9: Omissions, Biases, and Uncertainties and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Increased Water Supply Reliability to Calleguas Customers	+	The potential benefit of increased water supply reliability as a result of the SMP has not been included due to uncertainties of applying values from the literature to a partial improvement in water supply reliability.
Avoided Imported Water Supply Costs to Local Water Suppliers	+	The cost estimate for avoided water imports assumes a 2.5 percent increase in real water rates. This is a conservative estimate given that the annual average rate of increase in treated Tier 2 water supplied by Metropolitan has been approximately 6.5 percent in real terms over the last 5 years.
SMP Project Life	+	To coincide with the useful life of the SMP desalters, this analysis assumes a 37-year project life for Phase 2A of the SMP (through 2049). In actuality, the useful life of the pipeline will be at least 50 years. Assuming the desalters will be rebuilt after 30 years, the SMP will continue to provide benefits past 2049. Thus, the present value benefit of avoided imported water would be greater than the monetized amount for this analysis.
Benefits Associated with CamSan/Camrosa Recycled Water Interconnection and Other Municipal WWTP Dischargers	+	Benefits and costs associated with the CamSan/Camrosa Recycled Water Interconnection and other municipal WWTPs that will discharge excess recycled water to the SMP are not included in the monetized analysis of benefits for the SMP. It is unknown how much recycled water will be available for use via the SMP in the future, partially because such discharges are very weather-dependent.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+	=	Likely to increase net benefits relative to quantified estimates.
++	=	Likely to increase net benefits significantly.
–	=	Likely to decrease benefits.
– –	=	Likely to decrease net benefits significantly.
U	=	Uncertain, could be + or –.

References

Urban Water Management Plan. 2005. Calleguas.

SWP Delivery Reliability Report. 2009. Department of Water Resources. Available: http://baydeltaoffice.water.ca.gov/swpreliability/FinalReliabiltyReportsummary092710.pdf.

Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project: Calleguas Regional Salinity Management Pipeline, Phase 2A									
	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009							$0	1.00	$0
2010							$0	0.943	$0
2011	$5,658,569						$5,658,569	0.890	$5,036,126
2012	$9,341,431						$9,341,431	0.840	$7,846,802
2013				$7,475			$7,475	0.792	$5,920
2014				$7,475			$7,475	0.747	$5,584
2015				$7,475			$7,475	0.705	$5,270
2016				$7,475			$7,475	0.665	$4,971
2017				$7,475			$7,475	0.627	$4,687
2018				$7,475			$7,475	0.592	$4,425
2019				$7,475			$7,475	0.558	$4,171
2020				$7,475			$7,475	0.527	$3,939
2021				$7,475			$7,475	0.497	$3,715
2022				$7,475			$7,475	0.469	$3,506
2023				$7,475			$7,475	0.442	$3,304
2024				$7,475			$7,475	0.417	$3,117
2025				$7,475			$7,475	0.394	$2,945
2026				$7,475			$7,475	0.371	$2,773
2027				$7,475			$7,475	0.350	$2,616
2028				$7,475			$7,475	0.331	$2,474
2029				$7,475			$7,475	0.312	$2,332
2030				$7,475			$7,475	0.294	$2,198
2031				$7,475			$7,475	0.278	$2,078
2032				$7,475			$7,475	0.262	$1,958
2033				$7,475			$7,475	0.247	$1,846
2034				$7,475			$7,475	0.233	$1,742
2035				$7,475			$7,475	0.220	$1,645
2036				$7,475			$7,475	0.207	$1,547
2037				$7,475			$7,475	0.196	$1,465
2038				$7,475			$7,475	0.185	$1,383
2039				$7,475			$7,475	0.174	$1,301
2040				$7,475			$7,475	0.164	$1,226
2041				$7,475			$7,475	0.155	$1,159
2042				$7,475			$7,475	0.146	$1,091
2043				$7,475			$7,475	0.138	$1,032
2044				$7,475			$7,475	0.130	$972
2045				$7,475			$7,475	0.123	$919
2046				$7,475			$7,475	0.116	$867
2047				$7,475			$7,475	0.109	$815
2048				$7,475			$7,475	0.103	$770
2049				$7,475			$7,475	0.097	$725
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$12,975,417
Comments:									

(1) The incremental change in O&M costs attributable to the project.

Table 12 - Annual Water Supply Benefits

(All benefits should be in 2009 dollars)

Project: Calleguas Regional Salinity Management Pipeline, Phase 2A

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of (Units)	Without Project	With Project	Change Resulting (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted (h) x (i) (1)
2009	Avoided imported water use	acre-feet (AF)	0	0	0	$ 781	$0	1.00	$0
2010	Avoided imported water use	AF	0	0	0	$ 923	$0	0.943	$0
2011	Avoided imported water use	AF	0	0	0	$ 946	$0	0.890	$0
2012	Avoided imported water use	AF	0	0	0	$ 969	$0	0.840	$0
2013	Avoided imported water use	AF	0	6,887	6,887	$ 994	$1,103,534	0.792	$873,999
2014	Avoided imported water use	AF	0	6,887	6,887	$ 1,018	$1,131,122	0.747	$844,948
2015	Avoided imported water use	AF	0	21,341	21,341	$ 1,044	$1,399,958	0.705	$986,970
2016	Avoided imported water use	AF	0	34,372	34,372	$ 1,070	$1,521,346	0.665	$1,011,695
2017	Avoided imported water use	AF	0	40,139	40,139	$ 1,097	$1,593,633	0.627	$999,208
2018	Avoided imported water use	AF	0	40,139	40,139	$ 1,124	$1,633,474	0.592	$967,017
2019	Avoided imported water use	AF	0	40,139	40,139	$ 1,152	$1,674,311	0.558	$934,265
2020	Avoided imported water use	AF	0	46,650	46,650	$ 1,181	$1,495,262	0.527	$788,003
2021	Avoided imported water use	AF	0	46,650	46,650	$ 1,210	$1,532,643	0.497	$761,724
2022	Avoided imported water use	AF	0	46,650	46,650	$ 1,241	$1,570,960	0.469	$736,780
2023	Avoided imported water use	AF	0	46,650	46,650	$ 1,272	$1,610,234	0.442	$711,723
2024	Avoided imported water use	AF	0	46,650	46,650	$ 1,304	$1,650,489	0.417	$688,254
2025	Avoided imported water use	AF	0	46,650	46,650	$ 1,336	$1,691,752	0.394	$666,550
2026	Avoided imported water use	AF	0	46,650	46,650	$ 1,370	$1,734,045	0.371	$643,331
2027	Avoided imported water use	AF	0	46,650	46,650	$ 1,404	$1,777,397	0.350	$622,089
2028	Avoided imported water use	AF	0	46,650	46,650	$ 1,439	$1,821,831	0.331	$603,026
2029	Avoided imported water use	AF	0	46,650	46,650	$ 1,475	$1,867,377	0.312	$582,622
2030	Avoided imported water use	AF	0	46,650	46,650	$ 1,512	$1,914,062	0.294	$562,734
2031	Avoided imported water use	AF	0	46,650	46,650	$ 1,550	$1,961,913	0.278	$545,412
2032	Avoided imported water use	AF	0	46,650	46,650	$ 1,588	$2,010,961	0.262	$526,872
2033	Avoided imported water use	AF	0	46,650	46,650	$ 1,628	$2,061,235	0.247	$509,125
2034	Avoided imported water use	AF	0	46,650	46,650	$ 1,669	$2,112,766	0.233	$492,274
2035	Avoided imported water use	AF	0	46,650	46,650	$ 1,710	$2,165,585	0.220	$476,429
2036	Avoided imported water use	AF	0	46,650	46,650	$ 1,753	$2,219,725	0.207	$459,483
2037	Avoided imported water use	AF	0	46,650	46,650	$ 1,797	$2,275,218	0.196	$445,943
2038	Avoided imported water use	AF	0	46,650	46,650	$ 1,842	$2,332,098	0.185	$431,438
2039	Avoided imported water use	AF	0	46,650	46,650	$ 1,888	$2,390,401	0.174	$415,930
2040	Avoided imported water use	AF	0	46,650	46,650	$ 1,935	$2,450,161	0.164	$401,826
2041	Avoided imported water use	AF	0	46,650	46,650	$ 1,984	$2,511,415	0.155	$389,269
2042	Avoided imported water use	AF	0	46,650	46,650	$ 2,033	$2,574,200	0.146	$375,833
2043	Avoided imported water use	AF	0	39,763	39,763	$ 2,084	$2,618,621	0.138	$361,370
2044	Avoided imported water use	AF	0	39,763	39,763	$ 2,136	$2,684,087	0.130	$348,931
2045	Avoided imported water use	AF	0	25,309	25,309	$ 2,189	$2,526,490	0.123	$310,758
2046	Avoided imported water use	AF	0	12,279	12,279	$ 2,244	$2,015,387	0.116	$233,785
2047	Avoided imported water use	AF	0	6,512	6,512	$ 2,300	$1,465,101	0.109	$159,696
2048	Avoided imported water use	AF	0	6,512	6,512	$ 2,358	$1,501,728	0.103	$154,678
2049	Avoided imported water use	AF	0	6,512	6,512	$ 2,417	$1,539,271	0.097	$149,309
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$21,173,300

Comments: Column e reflects the total amount of imported water avoided by all SMP-related projects. Column g shows the per AF cost of imported water. However, column h reflects the value of avoided imported water attributable to the pipeline itself (see Attachment 7). Thus, Column e x Column g is not equal to Column h. Column h equals e x g x % of benefits attributable to SMP. The percent of benefits attributable to the SMP is based on on the ratio of cost of the SMP to the overall cost of the SMP plus the desalters on which it depends to have concentrate to transport. That share is 2.7% of the total costs.

(1) *Complete these columns if dollar value is being claimed for the benefit.*

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project: Calleguas Regional Salinity Management Pipeline, Phase 2A			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$ 21,173,300			$ 21,173,300
Comments:			

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Camrosa Round Mountain Desalter (C-13)

Summary

The Camrosa Round Mountain Desalter is a 1.0 million gallon per day (mgd) brackish groundwater desalting facility being constructed by the Camrosa Water District (Camrosa). Construction of the Round Mountain Desalter will allow Camrosa to develop local brackish groundwater resources for potable use, thereby reducing Camrosa's demand for water imported from the Bay-Delta region through the State Water Project (SWP).

The Round Mountain Desalter will be supplied by a well under a 30-year renewable lease from California State University Channel Islands (CSUCI). The high-quality potable water produced by the desalter will provide a secondary source of water to the CSUCI campus. Surplus water not used by CSUCI will be delivered to other customers within Camrosa's service area.

The concentrate stream produced by the desalting process will be disposed of through the Calleguas Municipal Water District's (Calleguas) Regional Salinity Management Pipeline (SMP). The SMP is a cornerstone project integral to the planned construction of a series of brackish groundwater desalting facilities (including the Round Mountain Desalter); it is also necessary for overall salts management in the Calleguas Creek Watershed (Watershed) to comply with a Total Maximum Daily Loads (TMDL) for salts [chloride, sulfate, boron and total dissolved solids (TDS)].

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Implementation of the Round Mountain Desalter will take place in two phases. Phase 1 activities include refurbishment and reactivation of the existing University Well and the construction of a 0.5 mgd desalting facility and associated pipelines. Phase 1 is scheduled for completion in the fall of 2011. Once operating design parameters have been validated, Camrosa will expand production at the Round Mountain Desalter to 1.0 mgd. Phase 2 construction is scheduled for completion in the winter of 2012. Funding obtained through this Proposal will be used to fund construction-related activities associated with both phases of the project.

A summary of the benefits and costs of the project is provided in Table 10. Project costs and water supply benefits are discussed in more detail in the remainder of this attachment.

Costs

Total capital costs for the Round Mountain Desalter amount to $5,013,800 in 2009 dollars. The well and the desalting facility are the main capital items included in the budget for the project. The cost of easements for the pipeline is included in the project budget as a funding match. The 0.3-acre well site and the 0.1-acre site for the desalter are owned by Camrosa. The fair market values of these properties are included in the costs for economic analysis purposes in order to account for the opportunity cost of the land. The well site is valued at $26,500, and the land for the desalter is valued at $8,500.

Table 10: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$10,973,305
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Costs	$16,452,894
Avoided Water Supply Pipeline Costs	$4,864,022
Total Monetizable Benefits	$21,316,916
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Water Supply Reliability for Camrosa Customers	+
Improved Operational Flexibility for Calleguas and Metropolitan	+
Water Quality and Other Benefits	
Salt Removal and Avoided Introduction of Salts into the Watershed	++
Improved Groundwater Quality	+
Reduced Carbon Dioxide Emissions	+
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

At 1.0 mgd production, O&M costs for the Round Mountain Desalter (including periodic replacement costs) will average close to $580,000 per year. Over the 30-year project life, the sum of present value capital and O&M costs will amount to $10,973,305.

The "Without Project" Baseline

Currently, Camrosa relies on the purchase of approximately 7,100 acre-feet per year (AFY) from the SWP [via Calleguas and the Metropolitan Water District of Southern California (Metropolitan)] to meet roughly two-thirds of its potable water demands.[4] The balance of Camrosa's demand (about 3,600 AFY) is met using local groundwater sources. Although some aquifers within the Watershed contain high-quality water that needs little or no treatment prior to being delivered to the potable distribution system, these aquifers are being pumped at, near, or beyond practical sustainable yield. Most other sources of groundwater available to Camrosa, and in the Watershed in general, contain prohibitively high TDS levels. Therefore, increasing the production of local supplies for potable use will require advanced treatment technology (e.g., reverse osmosis).

Currently, CSUCI accounts for a relatively large percentage of total water demand within Camrosa's service area. Over the next 10 years, CSUCI is expected to grow from approximately 2,500 full-time equivalent students (FTES) to 15,000 FTES. In addition to expanding the core academic campus, CSUCI plans to construct on-campus housing and a large research and development park. This development will require potable water.

[4] From 2010 Urban Water Management Plan Purveyor Forecast Summary (aggregate demand forecast) provided by Calleguas.

CSUCI is located in a semi-remote location at the far end of Camrosa's service area and water is supplied through a single 3-mile 12-inch water line with two creek crossings. Because of its length and lack of redundancy, the potable water supply pipeline to the campus is vulnerable in the event of an earthquake or other emergency. In the absence of the Round Mountain Desalter, a second pipeline will need to be constructed in order to provide redundancy of supply and serve additional demands at CSUCI. The costs associated with the second pipeline will be avoided if the Round Mountain Desalter is constructed. These avoided costs are discussed in more detail below.

In addition to the expected growth at CSUCI, the population of Camrosa's service area is expected to increase from about 32,000 in 2010 to 37,000 by 2030. Additional water will be needed to support the demands of these new Camrosa customers.

Camrosa recognizes that a viable alternative to imported water is needed to improve water supply reliability during droughts and conveyance disruptions and to meet increased demands. In the future, the availability of imported water is subject to a number of natural and human forces and has become increasingly vulnerable to drought, catastrophic levee failures from flood and/or seismic events, and regulatory shut downs of pumping facilities to protect endangered species. The SWP Delivery Reliability Report from 2009 indicates that environmental water needs and climate change will result in a range of deliveries from 7 percent to 81 percent of the maximum contract amount over an 82-year simulation period under current conditions. Deliveries are expected to average 60 percent of maximum contract amount under current conditions, but decrease to approximately 35 percent of maximum contract amount over multiple dry years and increase to approximately 70 percent during multiple wet years. Deliveries under future conditions are similar. Therefore, SWP contractors, such as Metropolitan, cannot rely on the SWP for delivery of maximum contract amounts, now or in the future, which compels agencies dependent upon the SWP to pursue local water supply projects. Without the Round Mountain Desalter, Camrosa will continue to rely on imported water to meet the portion of total supply that would be supplied by the desalter. Thus, without this project, water supply reliability within the Camrosa service area will decrease.

Water Supply Benefits

This section describes the water supply benefits generated by the Round Mountain Desalter, including avoided imported water supply costs, avoided water supply pipeline costs, improved water supply reliability for Camrosa customers, and improved operational flexibility for Calleguas and Metropolitan.

Avoided Imported Water Supply Costs to Local Water Suppliers

This section presents the avoided imported water supply costs associated with the Round Mountain Desalter. First, the methodology used to allocate the value of this benefit across SMP-related projects is presented.

Round Mountain Desalter and the SMP: Integration of Projects and Project Benefits

The Round Mountain Desalter (and other brackish groundwater desalters) cannot exist and provide water supply benefits without development of the SMP for disposal of concentrate from the treatment process. The SMP and the desalters are each "necessary" for generating benefits, but neither is "sufficient" on its own to generate benefits. This raises the issue of how to apportion the benefits of the "joint SMP product" across the various necessary inputs (i.e., the SMP and desalters).

For this analysis, it is assumed that the water supply benefits of the SMP project components are proportional to the costs of each component. For example, if a single component (e.g., one desalter) accounts for 20 percent of the total combined costs, then it is assumed that 20 percent of the total joint benefits also can be attributed to that component.

The total cost of the suite of SMP projects is equal to the sum of the cost of the individual desalters plus the cost of the SMP. Currently, an estimated 11 desalters are slated to make use of the SMP, including the Round Mountain Desalter; Port Hueneme Water Agency's Brackish Water Reclamation Demonstration Facility (PHWA's BWRDF); Camrosa Santa Rosa Valley, Somis, Moorpark, Simi Valley, Tapo Canyon, and Golden State desalters; and two desalters that will be used for agricultural irrigation.

The PHWA BWRDF has been completed and will be connected to the lower portion of the SMP (which has also been constructed). For the purposes of allocating benefits, the cost of the PHWA BWRDF is therefore not included in the total cost of the suite of SMP projects because it is a sunk cost and is not dependent on future SMP components to generate benefits. The lower portion of the SMP (including the Hueneme Outfall and the pipe necessary to deliver flows to the outfall) is also not included in the total cost of the suite of SMP projects. This portion of the SMP is also considered a sunk cost.

For the desalters, cost information is only available for the Round Mountain Desalter. Thus, this desalter is used as a representative case to proportionally scale benefits and costs for the other anticipated desalters. That is, costs (and therefore, benefits) from the future desalters are scaled according to water yield in comparison with water yield of the Round Mountain Desalter.

The total costs of the SMP and the desalters (excluding the PHWA BWRDF and the lower portion of the SMP) are summarized in Table 11. The total cost of the overall SMP includes the cost of the pipe for Phase 2A of the SMP (which is the phase submitted for funding under this Proposal), as well as for pipe constructed in Phases 2B through 2F, and Phase 3. In addition, a total of nine other desalters (the ones listed above minus PHWA BWRDF and an agricultural desalters) are expected to be added between 2013 and approximately 2020.

Table 10 shows the present value capital and O&M costs for each component of the overall suite of SMP-related projects. As shown, the present value cost of the Round Mountain Desalter amounts to $11.0 million, or 2.3 percent of the total present value of all SMP-related project costs. Therefore, it is assumed that at full implementation of all SMP-related projects, 2.3 percent of the annual avoided imported water supply benefits associated with the SMP can be attributed to the Round Mountain Desalter.[5]

The allocation of water supply benefits across the various components of the SMP applies only to the benefits associated with avoided imported water, rather than to benefits that are specific to a given project. For example, as discussed below, the Round Mountain Desalter will make construction of a second water pipeline to supply CSUCI unnecessary. For this analysis, the benefit of this avoided cost is attributable to the Round Mountain Desalter only and is not counted in the analysis of benefits associated with the SMP.

[5] In years prior to full implementation of all desalters, benefits are scaled to reflect the percentage of total project costs up to that point. Thus, in earlier years of the project (2013–2019), before all the desalters are brought online, the Round Mountain Desalter will account for a higher percentage of total costs. In later years, after the desalter's useful life (2042), benefits will continue to accrue through the remaining desalters' useful project lives (2049). The Round Mountain Desalter will account for 0 percent of total project benefits in these years.

Table 11: Present Value Capital and O&M Costs for SMP Project Components

SMP Project Component	Present Value Cost	Percent of Total Cost
Round Mountain Desalter	$10,973,305	2.3
SMP (Phase 2A)	$12,975,416	2.7
SMP (Phase 2B-2F, and Phase 3)	$77,259,139	16.2
Other Desalters	$376,862,435	78.8
Total	$478,070,295	100.0

Monetized Benefit of Avoided Imported Water

To calculate the avoided cost of imported water purchases attributable to the suite of SMP projects over time, the amount of imported water offset from the desalters each year is multiplied by the estimated rate charged, at that time, to Camrosa and other local water suppliers by Calleguas.

To estimate future Calleguas water rates, it was assumed that Calleguas will continue to deliver a combination of 90 percent Tier 1 water from Metropolitan (which sells wholesale water to Calleguas for distribution to various entities in Ventura County) and 10 percent Tier 2 water (which is charged at a higher rate). When combined with Calleguas capital improvements and O&M charges, Calleguas' average water rate currently amounts to $923 per acre-foot (AF) in 2009 dollars. Based on historical water rates, it is assumed that Calleguas' water rates will increase each year (throughout the SMP project life) at a rate of 2.5 percent above inflation. This increase reflects real investments made by Metropolitan to maintain and improve physical and natural capital assets (i.e., to enhance Metropolitan's infrastructure and water portfolio, respectively).

Based on the timeline for building each desalter (assuming a useful project life of 30 years) and the estimated increase in Calleguas water rates, the total present value benefits associated with avoided imported water use for all the SMP projects amounts to more than $640 million, through 2049 (the end of the useful project life of the last desalter brought online). As discussed above, approximately 2.3 percent of total project benefits can be attributed to the Round Mountain Desalter on an annual basis (during full implementation). Because the Round Mountain Desalter comes online in 2013, benefits are calculated through 2042 (through the 30-year project life). For the Round Mountain Desalter, the total present value benefit of avoided use of imported water amounts to $16.5 million.

Avoided Water Supply Pipeline Costs

As noted in the without-project baseline discussion, Camrosa currently supplies water to CSUCI through a single 3-mile 12-inch water line. In the absence of the Round Mountain Desalter, a second pipeline will need to be constructed to provide redundancy of supply and serve additional demands at CSUSI. The costs associated with the second pipeline will be avoided due to the implementation of the Round Mountain Desalter.

Camrosa estimates that the second pipeline will be 2 miles long and 14 inches in diameter. It will also cross two creeks along the alignment to CSUCI. Based on these specifications, Camrosa estimates that the capital costs of the pipeline will amount to $5.7 million in 2009 dollars. O&M costs are expected to be about $6,580 per year in 2009 dollars, on average. Assuming the pipeline will be completed in 2013, total present value costs of the pipeline will amount to approximately $4,864,022 over a 30-year project life.

In actuality, the useful life of the avoided pipeline will be greater than 30 years (likely closer to 50 years). However, for the purposes of comparing the pipeline with the Round Mountain Desalter, a 30-year project life is assumed. The present value cost of the avoided pipeline will be greater if the project life were extended to 50 years and if recurring annual O&M costs from years 31 to 50 were counted.

It is important to note that the desalter will avoid both the import of additional SWP water to meet increased demands, as well as the costs associated with constructing a second water supply pipeline to deliver much of this water to CSUCI. This is not a double counting of benefits. Without the project, Camrosa will incur the costs associated with both activities. With the project, an additional supply pipeline to CSUCI will not be necessary because the desalter is located so close to CSUCI.

Increased Water Supply Reliability for Camrosa Customers

The reliability of a water supply refers to the ability to consistently meet water demands, even in times of drought or other constraints on source water availability. By avoiding the import of SWP water supplies, the Round Mountain Desalter will help retail agencies that depend on Calleguas to deliver imported water to address reliability issues. Calleguas' connection to Metropolitan is limited during peak demand periods by its current capacity. In addition, the availability of imported water is subject to climatic changes (i.e., drought) and other unforeseen events such as earthquakes and floods.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns over climate-related events), only a few studies have directly attempted to quantify the value of reliability (i.e., through nonmarket valuation studies). The results from these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly. Stated preference studies find that water customers are willing to pay \$95 to \$500 per household per year for total reliability (i.e., a 0 percent probability of their water supply being interrupted in times of drought).

In determining a value of increased reliability as a result of the Round Mountain Desalter, the challenge is to reasonably interpret these survey-based household monetary values. The values noted above reflect a per-household willingness to pay to ensure complete reliability (zero drought-related use restrictions in the future), whereas the Round Mountain Desalter only enhances overall reliability and does not guarantee 100 percent reliability. Thus, if applied directly to the number of households within the Camrosa service area, the dollar values from the studies would overstate the reliability value provided by the project.

One simple way to roughly adjust for this "whole versus part" problem is to attribute a portion of the total value of reliability to the portion of the problem that is solved by the project. To adjust for the partial improvement in reliability from the Round Mountain Desalter, it is assumed that household willingness to pay for improved reliability is directly proportional to the amount of water produced at the plant as a percentage of the total potable water supply. This represents the percentage of total supply that has been improved in terms of overall reliability (i.e., by offsetting imported water demand with local sources).

For example, the Round Mountain Desalter will produce 1,120 AFY beginning in 2013. In that year, total Camrosa potable water demand is expected to amount to about 12,000 AF. Thus, 9.3 percent of total potable demand will be met by water produced at the Round Mountain Desalter. To obtain a lower bound estimate for the value of improved reliability associated with this water, it is assumed that households within the Camrosa service area are willing to pay about \$8.80 per year (\$95 multiplied by 9.3 percent). Application of this dollar value per household to the approximately 12,000 households within the Camrosa service area would result in \$105,600 of benefits in 2013. This benefit could be calculated for each year of the project, taking into account population growth and the percentage of imported water supply that the Round Mountain Desalter avoids.

Due to the uncertainty involved in applying these numbers to this situation, this benefit estimate is not included in the tables. However, it is provided here to give an idea of the potential magnitude of this benefit.

Improved Operational Flexibility for Calleguas and Metropolitan

As a result of this project, desalted brackish groundwater is projected to account for up to 10 percent of water delivered to Camrosa customers. This will help both Calleguas and

Metropolitan directly in their supply operations, especially in the summer when it is more difficult for Calleguas and Metropolitan to meet peak water demands. This will help both Calleguas and Metropolitan directly in their supply operations, allowing for longer shut-downs, deferring capital improvements, and improving reliability in a vulnerable part of the system. The value of this increased operational flexibility is not monetized in the benefit tables.

Distribution of Project Benefits and Identification of Beneficiaries

Construction of the Round Mountain Desalter includes the full range of types of beneficiaries, as summarized in Table 12. At the local level, CSUCI and other Camrosa customers will benefit due to increased reliability of supply. Camrosa will benefit by avoiding costs associated with (1) importing additional SWP water and (2) constructing a second pipeline to CSUCI. Regionally, those dependent on supplies from Calleguas and Metropolitan will benefit from reduced demand on Calleguas and Metropolitan facilities. The Round Mountain Desalter will also provide statewide benefits by reducing demands on water supplies from the Bay-Delta region.

Table 12: Project Beneficiaries Summary

Local	Regional	Statewide
California State University, Channel Islands	Calleguas Municipal Water District	San Francisco Bay-Delta
Camrosa Water District	Metropolitan Water District of Southern California	

Project Benefits Timeline Description

The Round Mountain Desalter is expected to come online in 2013. For this analysis, it is assumed a 30-year useful project life for this desalter and the other desalters connected to the SMP. Water supply avoided costs are assumed to be proportional to the percentage of total costs of the overall suite of SMP projects that is attributable to the Round Mountain Desalter in a given year.

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, Camrosa prepared a draft Initial Study (IS). Based on findings from the IS, it was determined that the Round Mountain Desalter will result in no significant adverse environmental effects. A Negative Declaration was subsequently prepared and circulated for review and comment by the public and by Responsible and Trustee agencies. The Negative Declaration was certified and adopted by Camrosa’s Board of Directors in April 2010.

Summary of Findings

The monetized benefits from the Round Mountain Desalter project include the avoided cost of imported SWP supplies, as well as the avoided costs of constructing a second pipeline to supply water to the CSUCI campus.

The cost of treated SWP water supply delivered by Calleguas to Camrosa in 2011 is $946 per AF in 2009 dollars. This cost is expected to increase at a long-term real rate of 2.5 percent per year. The present value of avoided SWP water costs will total approximately $16.5 million. The capital cost of constructing a second water supply pipeline to CSUCI will amount to $5,700,000 in 2009 dollars. The annual O&M costs associated with the avoided pipeline will be about $6,578 per year, beginning in 2014. Together, present value avoided water supply costs associated with the Round Mountain Desalter total $21,316,916 in 2009 dollars over the life of the project.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In most cases, omissions lead to a downward bias in benefits: the Round Mountain Desalter is expected to be much more beneficial than the subset of benefits that can be monetized indicates. These issues are listed in Table 13.

Table 13: Omissions, Biases, and Uncertainties and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Increased Water Supply Reliability to Camrosa Customers	+	The potential benefit of increased water supply reliability as a result of the Round Mountain Desalter has not been included due to uncertainties of applying values from the literature to a partial improvement in water supply reliability.
Avoided Imported Water Supply Costs to Camrosa	+	The cost estimate for avoided water imports assumes a 2.5 percent increase in real water rates. This is a conservative estimate given that the annual average rate of increase of treated Tier 2 water supplied by Metropolitan has been approximately 6.5 percent in real terms over the last 5 years.
Pipeline Project Costs	U	The calculation of the present value of avoided water supply pipeline costs is a function of numerous variables. The project has not yet been designed. Cost estimates would likely change as plans for the project become more refined.
Pipeline Project Life	+	In addition, for the purposes of comparison, this analysis assumes a 30-year project life for the pipeline. In actuality, the useful life of the avoided pipeline would be at least 50 years. The present value cost of the avoided pipeline would be greater if the project life were extended to 50 years due to recurring annual O&M costs.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

Urban Water Management Plan. 2005.
Calleguas.

Table 11- Annual Cost of Project
(All costs should be in 2009 Dollars)
Project: Camrosa Round Mountain Desalter

	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009							$0	1.00	$0
2010							$0	0.943	$0
2011	$ 1,404,193						$1,404,193	0.890	$1,249,732
2012	$ 3,609,607						$3,609,607	0.840	$3,032,070
2013			$145,000	$434,000			$579,000	0.792	$458,568
2014			$145,000	$434,000			$579,000	0.747	$432,513
2015			$145,000	$434,000			$579,000	0.705	$408,195
2016			$145,000	$434,000			$579,000	0.665	$385,035
2017			$145,000	$434,000			$579,000	0.627	$363,033
2018			$145,000	$434,000			$579,000	0.592	$342,768
2019			$145,000	$434,000			$579,000	0.558	$323,082
2020			$145,000	$434,000			$579,000	0.527	$305,133
2021			$145,000	$434,000			$579,000	0.497	$287,763
2022			$145,000	$434,000			$579,000	0.469	$271,551
2023			$145,000	$434,000			$579,000	0.442	$255,918
2024			$145,000	$434,000			$579,000	0.417	$241,443
2025			$145,000	$434,000			$579,000	0.394	$228,126
2026			$145,000	$434,000			$579,000	0.371	$214,809
2027			$145,000	$434,000			$579,000	0.350	$202,650
2028			$145,000	$434,000			$579,000	0.331	$191,649
2029			$145,000	$434,000			$579,000	0.312	$180,648
2030			$145,000	$434,000			$579,000	0.294	$170,226
2031			$145,000	$434,000			$579,000	0.278	$160,962
2032			$145,000	$434,000			$579,000	0.262	$151,698
2033			$145,000	$434,000			$579,000	0.247	$143,013
2034			$145,000	$434,000			$579,000	0.233	$134,907
2035			$145,000	$434,000			$579,000	0.220	$127,380
2036			$145,000	$434,000			$579,000	0.207	$119,853
2037			$145,000	$434,000			$579,000	0.196	$113,484
2038			$145,000	$434,000			$579,000	0.185	$107,115
2039			$145,000	$434,000			$579,000	0.174	$100,746
2040			$145,000	$434,000			$579,000	0.164	$94,956
2041			$145,000	$434,000			$579,000	0.155	$89,745
2042			$145,000	$434,000			$579,000	0.146	$84,534
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$10,973,305

Comments: In addition to items included in the project budget, the initial costs reflect the 0.3-acre well site and the 0.1-acre site for the desalter, which are currently owned by Camrosa. The fair market value of these properties is included in the costs for economic analysis purposes in order to account for the opportunity cost of the land. The well site is valued at $26,500, and the land for the desalter is valued at $8,500.

(1) The incremental change in O&M costs attributable to the project.

Table 12 - Annual Water Supply Benefits

(All benefits should be in 2009 dollars)

Project: Camrosa Round Mountain Desalter

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009									
2010									
2011									
2012									
2013	Avoided imported water supply	acre-feet		1,120	1,120	$ 994	$933,258	0.792	$739,140
2014	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,018	$956,590	0.747	$714,572
2015	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,044	$1,183,944	0.705	$834,680
2016	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,070	$1,286,601	0.665	$855,590
2017	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,097	$1,347,735	0.627	$845,030
2018	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,124	$1,381,428	0.592	$817,806
2019	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,152	$1,415,964	0.558	$790,108
2020	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,181	$1,264,542	0.527	$666,414
2021	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,210	$1,296,156	0.497	$644,190
2022	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,241	$1,328,560	0.469	$623,095
2023	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,272	$1,361,774	0.442	$601,904
2024	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,304	$1,395,818	0.417	$582,056
2025	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,336	$1,430,714	0.394	$563,701
2026	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,370	$1,466,482	0.371	$544,065
2027	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,404	$1,503,144	0.350	$526,100
2028	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,439	$1,540,722	0.331	$509,979
2029	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,475	$1,579,240	0.312	$492,723
2030	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,512	$1,618,721	0.294	$475,904
2031	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,550	$1,659,189	0.278	$461,255
2032	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,588	$1,700,669	0.262	$445,575
2033	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,628	$1,743,186	0.247	$430,567
2034	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,669	$1,786,765	0.233	$416,316
2035	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,710	$1,831,435	0.220	$402,916
2036	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,753	$1,877,220	0.207	$388,585
2037	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,797	$1,924,151	0.196	$377,134
2038	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,842	$1,972,255	0.185	$364,867
2039	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,888	$2,021,561	0.174	$351,752
2040	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,935	$2,072,100	0.164	$339,824
2041	Avoided imported water supply	acre-feet		1,120	1,120	$ 1,984	$2,123,903	0.155	$329,205
2042	Avoided imported water supply	acre-feet		1,120	1,120	$ 2,033	$2,177,000	0.146	$317,842
Total Present Value of Discounted Benefits Based on Unit Value									$16,452,894
Comments:	Column e reflects the total amount of imported water avoided by the Round Mountain Desalter. Column h reflects the value of avoided imported water that is attributable to Desalter itself (as described in Attachment 7, a portion of the benefits are also attributable to the SMP). That ratio is determined based on the of cost of the Round Mountain Desalter relative to the overall cost of the SMP plus all of the desalters on which it depends have concentrate to transport. That share is 2.3% of the total costs.								

(1) *Complete these columns if dollar value is being claimed for the benefit.*

Table 13 - Annual Costs of Avoided Projects

(All avoided costs should be in 2009 dollars)

Project: Camrosa Round Mountain Desalter

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): second water supply pipeline *Avoided Project Description: This is a second pipeline to provide redundancy of supply and serve additional demands at the university. It will be 2 miles long and 14 inches in diameter.*				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2009				$ -	1.00	$0
2010				$ -	0.943	$0
2011				$ -	0.890	$0
2012	$ 5,700,000			$ 5,700,000	0.840	$4,788,000
2013			$ 6,578	$ 6,578	0.792	$5,210
2014			$ 6,578	$ 6,578	0.747	$4,914
2015			$ 6,578	$ 6,578	0.705	$4,637
2016			$ 6,578	$ 6,578	0.665	$4,374
2017			$ 6,578	$ 6,578	0.627	$4,124
2018			$ 6,578	$ 6,578	0.592	$3,894
2019			$ 6,578	$ 6,578	0.558	$3,671
2020			$ 6,578	$ 6,578	0.527	$3,467
2021			$ 6,578	$ 6,578	0.497	$3,269
2022			$ 6,578	$ 6,578	0.469	$3,085
2023			$ 6,578	$ 6,578	0.442	$2,907
2024			$ 6,578	$ 6,578	0.417	$2,743
2025			$ 6,578	$ 6,578	0.394	$2,592
2026			$ 6,578	$ 6,578	0.371	$2,440
2027			$ 6,578	$ 6,578	0.350	$2,302
2028			$ 6,578	$ 6,578	0.331	$2,177
2029			$ 6,578	$ 6,578	0.312	$2,052
2030			$ 6,578	$ 6,578	0.294	$1,934
2031			$ 6,578	$ 6,578	0.278	$1,829
2032			$ 6,578	$ 6,578	0.262	$1,723
2033			$ 6,578	$ 6,578	0.247	$1,625
2034			$ 6,578	$ 6,578	0.233	$1,533
2035			$ 6,578	$ 6,578	0.220	$1,447
2036			$ 6,578	$ 6,578	0.207	$1,362
2037			$ 6,578	$ 6,578	0.196	$1,289
2038			$ 6,578	$ 6,578	0.185	$1,217
2039			$ 6,578	$ 6,578	0.174	$1,145
2040			$ 6,578	$ 6,578	0.164	$1,079
2041			$ 6,578	$ 6,578	0.155	$1,020
2042			$ 6,578	$ 6,578	0.146	$960
Total Present Value of Discounted Costs (Sum of Column (g))						$4,864,022
(%) Avoided Cost Claimed by Project						100%
Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						$4,864,022
Comments:						

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project: Camrosa Round Mountain Desalter			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$ 16,452,894	$ 4,864,022		$ 21,316,916
Comments: This project will avoid the both the import of SWP water as well as the construction of a water supply pipeline that would deliver additional water to the CSU Channel Islands Campus. This is not a double counting of benefits because without the project, Camrosa would incur the costs associated with both activities. With the project, an additional supply pipeline to CSUCI will not be necessary because the desalter is located near CSUCI.			

CamSan/Camrosa Recycled Water Interconnection (C-15)

Summary

The Camarillo Sanitary District (CamSan) is planning to construct the CamSan/Camrosa Recycled Water Interconnection (RW Interconnection). CamSan provides wastewater collection and treatment for portions of the City of Camarillo. Water service (both recycled and potable) within the City of Camarillo (City) is provided by a number of different entities, including the City and Camrosa Water District (Camrosa). The RW Interconnection is a 24-inch-diameter pipeline that will deliver tertiary-treated wastewater effluent (i.e., recycled water) from CamSan's wastewater treatment plant (WWTP) to Camrosa's storage ponds and customers, as well as to City of Camarillo customers. The RW Interconnection is needed to comply with Total Maximum Daily Loads (TMDL) for salts in the Calleguas Creek Watershed (Watershed) and develop local water supplies to improve the region's water reliability.

CamSan currently delivers 1.3 million gallons per day (mgd) of recycled water from its WWTP to customers within its service area. At current WWTP capacity (3.8 mgd), the RW Interconnection will enable the delivery of an additional 2.5 mgd of recycled water to agricultural and landscape irrigation customers within Camrosa and the City of Camarillo service areas. These customers currently use a mix of groundwater and imported water to irrigate their lands.

As wastewater influent to the WWTP increases over time due to population growth, the amount of recycled water produced at the plant and conveyed through the RW Interconnection will also increase. By 2030, when the WWTP reaches maximum capacity of 6.75 mgd, the RW Interconnection will be used to deliver a total of 5.45 mgd of recycled water to City of Camarillo and Camrosa customers. The City of Camarillo will use up to 2.9 mgd [3,240 acre-feet per year (AFY)] of recycled water delivered via the RW Interconnection. Recycled water in excess of that amount will be made available to Camrosa.

It is estimated that during approximately 30 days during the wet winter months, agricultural and landscape irrigation customers will have no demand for CamSan's supply of recycled water for irrigation. When this occurs, recycled water from the WWTP will be discharged through the RW Interconnection to Calleguas Municipal Water District's (Calleguas) Salinity Management Pipeline (SMP). Winter discharges to the SMP will also include the 1.3 mgd of effluent that is currently provided to existing recycled water customers, when it cannot be used for irrigation purposes. Connection to the SMP will allow CamSan to avoid discharging this effluent into Conejo Creek and will assist in transporting accumulated salts out of the Watershed. Excess recycled water discharged to the SMP will be available for use downstream for agricultural irrigation, if there is demand for it, or will be discharged through the Hueneme Outfall.[6]

A summary of all benefits and costs of the project is provided in Table 14. Project costs and water supply benefits are discussed in the remainder of this attachment.

[6] To simplify the analysis, the benefits of this project are not included in the overall allocation of benefits among the SMP and the desalters on which the SMP depends. Although the RW Interconnection will discharge to the SMP for approximately 30 days per year, the amount of recycled water to be discharged with the RW Interconnection is small compared to the total discharges from the desalters and other anticipated dischargers.

Table 14: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$4,346,119
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Supply Costs for the City of Camarillo	$18,220,720
Avoided Local Surface Water Costs	$6,549,615
Avoided Groundwater Pumping Costs	$2,729,496
Water Quality and Other Benefits	
Avoided Wastewater Treatment Costs	$15,322,941
Total Monetizable Benefits	$42,822,772
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Water Supply Reliability for Camarillo Customers	+
Improved Operational Flexibility for Calleguas and Metropolitan	+
Reduced Groundwater Usage on the Oxnard Plain	+
Water Quality Benefits	
Avoided Introduction of Additional Salts into the Watershed	++
Reduced Carbon Dioxide Emissions	++
Reduced Stress on the Bay-Delta	+
Improved Water Quality and Ecological Value in Mugu Lagoon	+
Agricultural Benefits	+

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Costs

Capital costs for the project total $5,500,000 in 2009 dollars. Direct construction and implementation costs account for $4,235,000 (about 77 percent) of total capital costs. Project administration, land purchase, planning, design, environmental documentation and compliance, and construction contingency costs account for the remainder of the capital budget. O&M costs (including periodic replacement costs) will average about $3,289 per mile of pipeline per year. This amounts to $5,986 per year for the 1.82-mile-long RW Interconnection. Over the 50-year project life (through 2063, 50 years after the project comes online), the sum of present value capital and O&M costs will amount to $4,346,119.

The "Without Project" Baseline

The City of Camarillo currently provides a blend of approximately 45 percent groundwater (4,635 AFY) and 55 percent imported water (5,665 AFY) from California's State Water Project (SWP) for potable use. SWP water is provided by Calleguas, which purchases this water from the Metropolitan Water District of Southern California (Metropolitan). Most agricultural and large landscape irrigation customers within the service area do not receive 100 percent of their supply from the City. These customers typically use groundwater from private wells to supplement supplies provided by the City. On average, these customers use a mix of about 66 percent groundwater (much of which is supplied by private wells) and 34 percent imported water.[7]

Camrosa currently relies on the purchase of approximately 7,100 AFY from the SWP (via Calleguas and Metropolitan) to meet roughly two-thirds of its potable water demands.[8] The balance of Camrosa's potable demand (about 3,600 AFY) is met through local groundwater sources. Many of the agricultural customers within the Camrosa service area use non-potable creek water delivered via the Conejo Creek Diversion to irrigate their lands. A large percentage of this water originates from the Hill Canyon WWTP upstream, which discharges tertiary-treated effluent directly into the creek.

The use of recycled water by Camarillo customers will offset the use of both imported water and groundwater. Recycled water delivered to agricultural customers within Camrosa's service area will offset the use of non-potable surface water from Conejo Creek. Instead of being used for irrigation water by Camrosa customers, the Conejo Creek Diversion water offset as a result of the RW Interconnection will be delivered to the Pleasant Valley County Water District (PVCWD), which will use this water in lieu of groundwater, reducing groundwater usage in the Oxnard Plain where overdraft and saltwater intrusion are occurring.

The availability of imported water from the SWP is subject to a number of natural and human forces and has become increasingly vulnerable to drought, catastrophic levee failures from flood and/or seismic events, and regulatory shut downs of pumping facilities to protect endangered species. The SWP Delivery Reliability Report from 2009 indicates that environmental water needs and climate change will result in a range of deliveries from 7 percent to 81 percent of the maximum contract amount over an 82-year simulation period under current conditions. Deliveries are expected to average 60 percent of maximum contract amount under current conditions, but decrease to approximately 35 percent of maximum contract amount over multiple dry years and increase to approximately 70 percent during multiple wet years. Deliveries under future conditions are similar. Therefore, SWP contractors, such as Metropolitan, cannot rely on the SWP for delivery of maximum contract amounts, now or in the future, which compels agencies dependent upon the SWP to pursue local water supply projects. Reduced demand for imported water will increase water supply reliability within both the Camrosa and Camarillo service areas and therefore to the Calleguas and Metropolitan service areas.

In addition, although some aquifers within the Watershed contain high-quality water that needs little or no treatment prior to being delivered to the potable distribution system, these aquifers are being pumped at, near, or beyond practical sustainable yield. Most other sources of groundwater in the City, and in the Watershed in general, contain prohibitively high total dissolved solids (TDS) levels. The level of TDS has been steadily increasing in the groundwater over time, with TDS exceeding 1,000 milligrams per liter in many locations. Groundwater pumpers must blend increasing quantities of imported water with the groundwater in order to meet drinking water standards.

Without the RW Interconnection, potable water and groundwater will continue to be used for non-potable purposes, including agriculture and landscape irrigation. Reliance on imported water will increase. Groundwater will continue to be pumped at unsustainable levels. This will further increase the demand for imported water, which will be necessary in order to blend with groundwater to meet drinking water standards. Increased demand for both imported SWP water and groundwater will decrease water supply reliability.

Water Supply Benefits

This section describes the water supply benefits generated by the RW Interconnection, including avoided imported water supply costs for the

[7] This average is based on the average supply mix for customers who will receive recycled water.

[8] From the 2010 Urban Water Management Plan, Purveyor Forecast Summary (aggregate demand forecast) provided by Calleguas.

City, avoided groundwater pumping costs for Camarillo agricultural and landscape irrigation customers, avoided non-potable local surface water supply costs for Camrosa customers, improved water supply reliability, and improved operational flexibility for Calleguas and Metropolitan.

Avoided Imported Water Supply Costs for the City of Camarillo

When the RW Interconnection comes online in 2014, it will enable the use of an additional 3.1 mgd (about 3,450 AFY) of recycled water.[9] On an estimated 30 wet winter days each year, there will be insufficient demand for irrigation and the recycled water will be discharged to the SMP. Thus, total new recycled water use will amount to close to 3,200 AFY. The amount of recycled water made available via the RW Interconnection will continue to increase through 2030 when the WWTP reaches full capacity. In 2030, the RW Interconnection will enable about 5,590 AFY of additional recycled water use (5.4 mgd, minus the amount discharged to the SMP). The City will use up to 3,240 AFY of this recycled water.

As a result of the RW Interconnection, many agricultural and landscape irrigation customers in the City will use non-potable recycled water to irrigate their lands rather than imported SWP water. On average, existing Camarillo recycled water customers receive about 34 percent of their water from the City, while 66 percent is supplied through private groundwater wells. Thus, for this analysis, it is assumed that 34 percent of the recycled water served to City customers will offset the use of imported SWP water delivered by the City via Calleguas. Although the City uses a mix of imported water and groundwater to supply its customers, imported water is more expensive to provide and is the marginal water source. Thus, reduced overall City water demand due to increased use of recycled water will result in reduced reliance on SWP water.

To calculate the avoided cost of imported water purchases over time, the amount of imported water avoided each year was multiplied by the estimated rate charged to local water suppliers by Calleguas. To estimate future Calleguas water rates for local suppliers, it is assumed that Calleguas will continue to deliver a combination of 90 percent Tier 1 water from Metropolitan (which sells wholesale water to Calleguas for distribution to various entities in Ventura County) and 10 percent Tier 2 water (which is charged at a higher rate). When combined with Calleguas capital improvements and O&M charges, Calleguas' average water rate currently amounts to $923/acre-foot (AF). Based on historical water rates, it is assumed that Calleguas' water rates will increase each year (throughout the RW Interconnection's 50-year project life) at a real rate of 2.5 percent. This increase reflects investments made by Metropolitan to maintain and improve physical and natural capital assets (i.e., to enhance Metropolitan's infrastructure and water portfolio, respectively).

At the full WWTP capacity of 6.75 mgd (reached in 2030), the use of new recycled water within the City will offset the use of approximately 1,015 AFY of imported SWP water. Over the 50-year project life, total avoided water imports will amount to 50,284 AF. Based on the timeline of recycled water production and the estimated increase in Calleguas water rates, the present value benefits associated with avoided imported water use due to the RW Interconnection will total more than $18.2 million through 2063.

Avoided Groundwater Pumping Costs

As noted above, many of the agricultural and landscape irrigation customers within the City use groundwater supplied by private wells to meet a portion of their irrigation demands. For this analysis, it is assumed that the average mix of water sources used by current recycled water customers (i.e., 66 percent groundwater, 34 percent imported water) would also apply to future customers who will receive recycled water via the RW Interconnection. Thus, 66 percent of the recycled water used by City customers will offset current groundwater use.

As described earlier, when the RW Interconnection comes online in 2014, CamSan will begin supplying 3.1 mgd (about 3,450 AFY) of

[9] Based on expected growth in WWTP capacity to about 4.4 mgd by 2014 (scaled linearly to meet 6.75 mgd by 2030), minus existing recycled water use of 1.31 mgd.

recycled water to City customers. After accounting for the recycled water discharged to the SMP when there are no irrigation demands due to recent rainfall, the total amount of new recycled water use will be close to 3,200 AFY. Given the mix of water supply sources used by these customers, this will offset 1,955 AFY of private groundwater pumping. This offset will occur each year through 2063 and total 96,856 AF over the project life.

To determine the value of offset groundwater use, current groundwater pumping costs of approximately $115/AF are multiplied by the amount of offset groundwater use. Over the 50-year project life, the total present value of avoided costs for groundwater pumping will amount to about $2.7 million.

Avoided Local Surface Water Supply Costs

Agricultural customers within the Camrosa service area will begin receiving recycled water via the RW Interconnection in 2015 (after the City has meets its full recycled water demand of 3,240 AF). By 2030, when the WWTP reaches full capacity, Camrosa customers will use an estimated 2,622 AFY of recycled water made available as a result of the project. The use of this water will offset the use of non-potable surface water delivered via the Conejo Creek Diversion. Over the 50-year project life, the total amount of recycled water delivered to Camrosa customers via the RW Interconnection will amount to 110,260 AF.

To determine the value of offset local surface water use to agricultural and landscape irrigation customers, the cost of approximately $315/AF of water delivered via the Conejo Creek Diversion is multiplied by the amount of offset water use. Over the 50-year project life, total present value avoided costs for purchasing non-potable local surface water will amount to about $6.5 million.

Increased Water Supply Reliability for Camarillo Customers

The reliability of a water supply refers to the ability to meet water demands on a consistent basis, even in times of drought or other constraints on source water availability. The RW Interconnection will help address reliability issues for the City by offsetting the use of imported water delivered by Metropolitan via Calleguas. Calleguas' connection to Metropolitan is limited during peak demand periods by its current capacity. In addition, the availability of imported water is subject to climatic changes (i.e., drought) and other unforeseen events such as earthquakes and floods, as described earlier.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns over climate-related events), only a few studies have directly attempted to quantify its value (i.e., through nonmarket valuation studies). The results from these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly. Stated preference studies find that water customers are willing to pay $95 to $500 per household per year for total reliability (i.e., a 0 percent probability of their water supply being interrupted in times of drought).

The challenge for use of these values to determine a value of increased reliability as a result of the RW Interconnection is recognizing how to reasonably interpret these survey-based household monetary values. The values noted above reflect a willingness to pay per household to ensure complete reliability (zero drought-related use restrictions in the future), whereas the RW Interconnection only enhances overall reliability and does not guarantee 100 percent reliability. Thus, if applied directly to the number of households within the City service area, the dollar values from the studies would overstate the reliability value provided by the project.

A simple way to roughly adjust for this "whole versus part" problem is to attribute a portion of the total value of reliability to the portion of the problem that is solved by the project. To adjust for the partial improvement in reliability from the RW Interconnection, it is assumed that household willingness to pay for improved reliability is directly proportional to the amount of recycled water that will offset imported water as a percentage of the total potable water supply.[10] This represents the percentage of total supply that has been improved in terms of overall reliability (i.e., by offsetting imported water demand with local sources).

For example, the RW Interconnection will offset more than 1,015 AFY of imported water at full implementation in 2030. In that year, total City potable demand will be about 12,200 AFY (without the project). Thus, about 8 percent of total potable demand will be met by recycled water produced at the CamSan WWTP and made available through the RW Interconnection. To obtain a lower bound estimate for the value of improved reliability associated with this water, it is assumed that households within the City are willing to pay about $7.60 per year ($95 multiplied by 8.0 percent). Applying this dollar value per household to the approximately 18,000 households within the Camrosa and City service areas would result in $136,800 in 2009 dollars of benefits in 2030.

Due to the uncertainty involved in applying these numbers to this situation, this benefit estimate is not included in the tables. However, it is provided here to give an idea of the potential magnitude of this benefit.

Improved Operational Flexibility for Calleguas and Metropolitan

As a result of the RW Interconnection, when the CamSan WWTP reaches full capacity in 2030, recycled water use will offset 1,015 AFY of imported SWP water, especially in the summer when it is more difficult for Calleguas and Metropolitan to meet peak water demands. This will help both Calleguas and Metropolitan directly in their supply operations, allowing for longer shutdowns, deferring capital improvements, and improving reliability in a vulnerable part of the system. The value of this increased operational flexibility is not monetized in the benefit tables.

Reduced Groundwater Usage on the Oxnard Plain

The local surface water offset by the use of RW Interconnection water within the Camrosa service area will be delivered to PVCWD, which will use this water in lieu of groundwater pumped from the Oxnard Plain. Steady increases in the demand for groundwater in the Oxnard Plain have led to groundwater overdraft, which has resulted in seawater intrusion, inter-aquifer flow, and land subsidence. By 2030, more than 2,600 AFY of creek water will be available to PVCWD for use in lieu of groundwater, helping to reduce groundwater overdraft in the Oxnard Plain.

Distribution of Project Benefits and Identification of Beneficiaries

The RW Interconnection includes the full range of types of beneficiaries, as summarized in Table 15. At the local level, City customers will benefit due to increased reliability of supply and by avoiding costs associated with importing additional SWP water. City recycled water customers will benefit from avoided groundwater pumping costs, while Camrosa's recycled water customers will benefit from avoided local surface water supply purchases. PVCWD water customers benefit by providing a local surface water to offset groundwater pumping providing in-lieu recharge in an overdrafted basin. Regionally, those dependent on supplies from Calleguas and Metropolitan will benefit from reduced demand on Calleguas and Metropolitan facilities. The RW Interconnection will provide statewide benefits by reducing demands on water supplies from the Bay-Delta region. The project also helps meet statewide goals to increase use of recycled wastewater by at least 1 million AFY by 2020 and by at least 2 million AFY by 2030 (State Water Resources Control Board, 2009).

[10] Groundwater use offset by the RW Interconnection may not result in significant increased reliability for City of Camarillo or Camrosa customers because it is a private source of water. However, regionally, groundwater reliability is compromised because over-pumping has resulted in overdraft and seawater intrusion. In addition, water supply reliability will not increase within the Camrosa service area because the use of recycled water via the RW Interconnection will offset the use of non-potable water from Conejo Creek.

Table 15: Project Beneficiaries Summary

Local	Regional	Statewide
City of Camarillo	Calleguas Municipal Water District	San Francisco Bay-Delta
Camrosa Water District	Metropolitan Water District of Southern California	California – Recycled Water Use Goals
	Pleasant Valley County Water District and other Oxnard Plain groundwater pumpers	

Project Benefits Timeline Description

The RW Interconnection is expected to come online in mid-2014. For this analysis, a 50-year useful project life is assumed. Design efforts for the project should be completed by June 2012 and construction will begin in January 2013. Construction is expected to take 18 months.

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, a the Final Program Environmental Impact Report (PEIR) for the Renewable Water Resources Management Program for the Southern Reaches of the Calleguas Creek Watershed, which includes the RW Interconnection, was previously certified. Camrosa served as the lead agency for the Program EIR, and CamSan was a responsible agency. Based on findings from the PEIR, it was determined that the RW Interconnection is not expected to result in any significant adverse effects.

Summary of Findings

The monetized benefits from the RW Interconnection include the avoided cost of imported SWP supplies, avoided costs of groundwater pumping for City recycled water customers, and avoided local surface water supply purchases for Camrosa's recycled water customers.

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The cost of treated SWP water supply delivered by Calleguas to Camrosa in 2011 is projected to be $946/AF in 2009 dollars. This cost is expected to increase at a long-term real rate of 2.5 percent per year. The cost to pump groundwater for irrigation is about $115/AF, and the cost of purchasing water for delivery via the Conejo Creek Diversion is about $315/AF. Together, the avoided water supply costs associated with the RW Interconnection total $27.5 million in present value in 2009 dollars over the 50-year life of the project.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In most cases, omissions lead to a downward bias in benefits: the RW Interconnection is expected to be much more beneficial than the subset of benefits that can be monetized indicates. These issues are listed in Table 16.

Table 16: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Increased Water Supply Reliability for City of Camarillo Customers	+	The potential benefit of increased water supply reliability as a result of the RW Interconnection has not been included due to uncertainties of applying values from the literature to a partial improvement in water supply reliability.
Avoided Imported Water Supply Costs	+	The cost estimate for avoided water imports assumes a 2.5 percent increase in real water rates. This is a conservative estimate given that the annual average rate of increase of treated Tier 2 water supplied by Metropolitan has been approximately 6.5 percent in real terms over the last 5 years.
Avoided Water Supply Costs	U	The mix of water sources used by Camarillo customers is uncertain for future customers. If new recycled water customers used more than 34 percent imported water to irrigate their lands, benefits would be larger. Alternatively a higher use of groundwater being offset would result in smaller benefits because groundwater is much cheaper than imported water.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

Recycled Water Policy. 2009. State Water Resources Control Board. California Environmental Protection Agency. Available: http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf.

SWP Delivery Reliability Report. 2009. Department of Water Resources. Available: http://baydeltaoffice.water.ca.gov/swpreliability/FinalReliabiltyReportsummary092710.pdf.

Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project: CamSan/Camrosa Recycled Water Interconnection									
	Initial Costs	Operations and Maintenance Costs [1]						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009							$0	1.00	$0
2010							$0	0.943	$0
2011	$38,933						$38,933	0.890	$34,651
2012	$111,267						$111,267	0.840	$93,464
2013	$3,315,374						$3,315,374	0.792	$2,625,777
2014	$2,034,426			$2,993			$2,037,419	0.747	$1,521,952
2015				$5,986			$5,986	0.705	$4,220
2016				$5,986			$5,986	0.665	$3,981
2017				$5,986			$5,986	0.627	$3,753
2018				$5,986			$5,986	0.592	$3,544
2019				$5,986			$5,986	0.558	$3,340
2020				$5,986			$5,986	0.527	$3,155
2021				$5,986			$5,986	0.497	$2,975
2022				$5,986			$5,986	0.469	$2,807
2023				$5,986			$5,986	0.442	$2,646
2024				$5,986			$5,986	0.417	$2,496
2025				$5,986			$5,986	0.394	$2,358
2026				$5,986			$5,986	0.371	$2,221
2027				$5,986			$5,986	0.350	$2,095
2028				$5,986			$5,986	0.331	$1,981
2029				$5,986			$5,986	0.312	$1,868
2030				$5,986			$5,986	0.294	$1,760
2031				$5,986			$5,986	0.278	$1,664
2032				$5,986			$5,986	0.262	$1,568
2033				$5,986			$5,986	0.247	$1,479
2034				$5,986			$5,986	0.233	$1,395
2035				$5,986			$5,986	0.220	$1,317
2036				$5,986			$5,986	0.207	$1,239
2037				$5,986			$5,986	0.196	$1,173
2038				$5,986			$5,986	0.185	$1,107
2039				$5,986			$5,986	0.174	$1,042
2040				$5,986			$5,986	0.164	$982
2041				$5,986			$5,986	0.155	$928
2042				$5,986			$5,986	0.146	$874
2043				$5,986			$5,986	0.138	$826
2044				$5,986			$5,986	0.130	$778
2045				$5,986			$5,986	0.123	$736
2046				$5,986			$5,986	0.116	$694
2047				$5,986			$5,986	0.109	$652
2048				$5,986			$5,986	0.103	$617
2049				$5,986			$5,986	0.097	$581
2050				$5,986			$5,986	0.092	$551
2051				$5,986			$5,986	0.087	$521
2052				$5,986			$5,986	0.082	$491
2053				$5,986			$5,986	0.077	$461
2054				$5,986			$5,986	0.073	$437
2055				$5,986			$5,986	0.069	$413
2056				$5,986			$5,986	0.065	$389
2057				$5,986			$5,986	0.061	$365
2058				$5,986			$5,986	0.058	$347
2059				$5,986			$5,986	0.054	$323
2060				$5,986			$5,986	0.051	$307
2061				$5,986			$5,986	0.048	$289
2062				$5,986			$5,986	0.046	$273
2063				$5,986			$5,986	0.043	$257
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$4,346,119

Comments: O&M costs (including periodic replacement costs) will average about $3,289 per mile of pipeline per year. This amounts to $5,986 per year for the 1.82-mile-long RW Interconnection. It is assumed that the RW Interconnection will begin operation starting July 2014.

Table 12 - Annual Water Supply Benefits (All benefits should be in 2009 dollars) Project: CamSan/Camrosa Recycled Water Interconnection									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009								1.000	$0
2010								0.943	$0
2011								0.890	$0
2012								0.840	$0
2013								0.792	$0
2014	Avoided imported water use	acre-feet (AF)	0	541	541	$994	$537,448	0.747	$401,473
	Avoided groundwater use	AF	0	1,042	1,042	$115	$119,827.49	0.747	$89,511
	Avoided non-potable local surface water use	AF	0	-	-	$315	$0.00	0.747	$0
2015	Avoided imported water use	AF	0	1,015	1,015	$1,018	$1,033,786.22	0.705	$728,819
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.705	$158,532
	Avoided non-potable local surface water use	AF	0	347	347	$315	$109,295.55	0.705	$77,053
2016	Avoided imported water use	AF	0	1,015	1,015	$1,044	$1,059,630.88	0.665	$704,655
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.665	$149,538
	Avoided non-potable local surface water use	AF	0	499	499	$315	$157,062.15	0.665	$104,446
2017	Avoided imported water use	AF	0	1,015	1,015	$1,070	$1,086,121.65	0.627	$680,998
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.627	$140,993
	Avoided non-potable local surface water use	AF	0	650	650	$315	$204,828.75	0.627	$128,428
2018	Avoided imported water use	AF	0	1,015	1,015	$1,097	$1,113,274.69	0.592	$659,059
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.592	$133,122
	Avoided non-potable local surface water use	AF	0	802	802	$315	$252,592.20	0.592	$149,535
2019	Avoided imported water use	AF	0	1,015	1,015	$1,124	$1,141,106.56	0.558	$636,737
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.558	$125,477
	Avoided non-potable local surface water use	AF	0	954	954	$315	$300,358.80	0.558	$167,600
2020	Avoided imported water use	AF	0	1,015	1,015	$1,152	$1,169,634.22	0.527	$616,397
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.527	$118,506
	Avoided non-potable local surface water use	AF	0	1,105	1,105	$315	$348,125.40	0.527	$183,462
2021	Avoided imported water use	AF	0	1,015	1,015	$1,181	$1,198,875.08	0.497	$595,841
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.497	$111,760
	Avoided non-potable local surface water use	AF	0	1,257	1,257	$315	$395,892.00	0.497	$196,758
2022	Avoided imported water use	AF	0	1,015	1,015	$1,210	$1,228,846.96	0.469	$576,329
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.469	$105,463
	Avoided non-potable local surface water use	AF	0	1,408	1,408	$315	$443,658.60	0.469	$208,076
2023	Avoided imported water use	AF	0	1,015	1,015	$1,241	$1,259,568.13	0.442	$556,729
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.442	$99,392
	Avoided non-potable local surface water use	AF	0	1,560	1,560	$315	$491,425.20	0.442	$217,210
2024	Avoided imported water use	AF	0	1,015	1,015	$1,272	$1,291,057.33	0.417	$538,371
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.417	$93,770
	Avoided non-potable local surface water use	AF	0	1,712	1,712	$315	$539,191.80	0.417	$224,843
2025	Avoided imported water use	AF	0	1,015	1,015	$1,304	$1,323,333.77	0.394	$521,394
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.394	$88,598
	Avoided non-potable local surface water use	AF	0	1,863	1,863	$315	$586,958.40	0.394	$231,262
2026	Avoided imported water use	AF	0	1,015	1,015	$1,336	$1,356,417.11	0.371	$503,231
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.371	$83,426
	Avoided non-potable local surface water use	AF	0	2,015	2,015	$315	$634,725.00	0.371	$235,483
2027	Avoided imported water use	AF	0	1,015	1,015	$1,370	$1,390,327.54	0.350	$486,615
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.350	$78,704
	Avoided non-potable local surface water use	AF	0	2,167	2,167	$315	$682,488.45	0.350	$238,871
2028	Avoided imported water use	AF	0	1,015	1,015	$1,404	$1,425,085.73	0.331	$471,703
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.331	$74,432
	Avoided non-potable local surface water use	AF	0	2,318	2,318	$315	$730,255.05	0.331	$241,714
2029	Avoided imported water use	AF	0	1,015	1,015	$1,439	$1,460,712.87	0.312	$455,742
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.312	$70,159
	Avoided non-potable local surface water use	AF	0	2,470	2,470	$315	$778,021.65	0.312	$242,743
2030	Avoided imported water use	AF	0	1,015	1,015	$1,475	$1,497,230.69	0.294	$440,186
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.294	$66,111
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.294	$242,784
2031	Avoided imported water use	AF	0	1,015	1,015	$1,512	$1,534,661.46	0.278	$426,636
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.278	$62,513
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.278	$229,571

Table 12 - Annual Water Supply Benefits
(All benefits should be in 2009 dollars)
Project: CamSan/Camrosa Recycled Water Interconnection

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2032	Avoided imported water use	AF	0	1,015	1,015	$1,550	$1,573,028.00	0.262	$412,133
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.262	$58,916
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.262	$216,358
2033	Avoided imported water use	AF	0	1,015	1,015	$1,588	$1,612,353.70	0.247	$398,251
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.247	$55,543
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.247	$203,971
2034	Avoided imported water use	AF	0	1,015	1,015	$1,628	$1,652,662.54	0.233	$385,070
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.233	$52,394
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.233	$192,410
2035	Avoided imported water use	AF	0	1,015	1,015	$1,669	$1,693,979.10	0.220	$372,675
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.220	$49,471
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.220	$181,675
2036	Avoided imported water use	AF	0	1,015	1,015	$1,710	$1,736,328.58	0.207	$359,420
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.207	$46,548
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.207	$170,939
2037	Avoided imported water use	AF	0	1,015	1,015	$1,753	$1,779,736.79	0.196	$348,828
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.196	$44,074
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.196	$161,856
2038	Avoided imported water use	AF	0	1,015	1,015	$1,797	$1,824,230.21	0.185	$337,483
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.185	$41,601
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.185	$152,772
2039	Avoided imported water use	AF	0	1,015	1,015	$1,842	$1,869,835.97	0.174	$325,351
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.174	$39,127
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.174	$143,688
2040	Avoided imported water use	AF	0	1,015	1,015	$1,888	$1,916,581.87	0.164	$314,319
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.164	$36,878
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.164	$135,430
2041	Avoided imported water use	AF	0	1,015	1,015	$1,935	$1,964,496.41	0.155	$304,497
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.155	$34,855
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.155	$127,998
2042	Avoided imported water use	AF	0	1,015	1,015	$1,984	$2,013,608.83	0.146	$293,987
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.146	$32,831
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.146	$120,566
2043	Avoided imported water use	AF	0	1,015	1,015	$2,033	$2,063,949.05	0.138	$284,825
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.138	$31,032
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.138	$113,960
2044	Avoided imported water use	AF	0	1,015	1,015	$2,084	$2,115,547.77	0.130	$275,021
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.130	$29,233
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.130	$107,353
2045	Avoided imported water use	AF	0	1,015	1,015	$2,136	$2,168,436.47	0.123	$266,718
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.123	$27,659
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.123	$101,573
2046	Avoided imported water use	AF	0	1,015	1,015	$2,189	$2,222,647.38	0.116	$257,827
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.116	$26,085
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.116	$95,792
2047	Avoided imported water use	AF	0	1,015	1,015	$2,244	$2,278,213.56	0.109	$248,325
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.109	$24,511
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.109	$90,012
2048	Avoided imported water use	AF	0	1,015	1,015	$2,300	$2,335,168.90	0.103	$240,522
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.103	$23,161
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.103	$85,057
2049	Avoided imported water use	AF	0	1,015	1,015	$2,358	$2,393,548.12	0.097	$232,174
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.097	$21,812
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.097	$80,102
2050	Avoided imported water use	AF	0	1,015	1,015	$2,417	$2,453,386.83	0.092	$225,712
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.092	$20,688
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.092	$75,973
2051	Avoided imported water use	AF	0	1,015	1,015	$2,477	$2,514,721.50	0.087	$218,781

Table 12 - Annual Water Supply Benefits (All benefits should be in 2009 dollars) Project: CamSan/Camrosa Recycled Water Interconnection									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.087	$19,564
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.087	$71,844
2052	Avoided imported water use	AF	0	1,015	1,015	$2,539	$2,577,589.54	0.082	$211,362
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.082	$18,439
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.082	$67,715
2053	Avoided imported water use	AF	0	1,015	1,015	$2,603	$2,642,029.27	0.077	$203,436
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.077	$17,315
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.077	$63,586
2054	Avoided imported water use	AF	0	1,015	1,015	$2,668	$2,708,080.01	0.073	$197,690
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.073	$16,415
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.073	$60,283
2055	Avoided imported water use	AF	0	1,015	1,015	$2,734	$2,775,782.01	0.069	$191,529
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.069	$15,516
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.069	$56,980
2056	Avoided imported water use	AF	0	1,015	1,015	$2,803	$2,845,176.56	0.065	$184,936
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.065	$14,616
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.065	$53,677
2057	Avoided imported water use	AF	0	1,015	1,015	$2,873	$2,916,305.97	0.061	$177,895
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.061	$13,717
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.061	$50,373
2058	Avoided imported water use	AF	0	1,015	1,015	$2,945	$2,989,213.62	0.058	$173,374
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.058	$13,042
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.058	$47,896
2059	Avoided imported water use	AF	0	1,015	1,015	$3,018	$3,063,943.96	0.054	$165,453
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.054	$12,143
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.054	$44,593
2060	Avoided imported water use	AF	0	1,015	1,015	$3,094	$3,140,542.56	0.051	$160,844
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.051	$11,517
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.051	$42,293
2061	Avoided imported water use	AF	0	1,015	1,015	$3,171	$3,219,056.12	0.048	$155,533
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.048	$10,865
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.048	$39,899
2062	Avoided imported water use	AF	0	1,015	1,015	$3,250	$3,299,532.53	0.046	$150,398
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.046	$10,250
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.046	$37,641
2063	Avoided imported water use	AF	0	1,015	1,015	$3,331	$3,382,020.84	0.043	$145,432
	Avoided groundwater use	AF	0	1,955	1,955	$115	$224,868.70	0.043	$9,670
	Avoided non-potable local surface water use	AF	0	2,622	2,622	$315	$825,794.55	0.043	$35,510
Project Life	Avoided imported water use	AF	0	50,284	50,284				
Project Life	Avoided groundwater use	AF	0	96,856	96,856				
Project Life	Avoided non-potable local surface water use	AF	0	110,260	110,260				
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$27,499,831

Comments: The RW Interconnection will allow agricultural and landscape irrigation customers of the City of Camarillo to use recycled water instead of surface water (SWP water is the marginal source). The cost of SWP water is assumed to grow at a 2.5% real rate into the future based on projected rate of increase from SWP wholesaler Calleguas. The project also will offset use of private groundwater wells within the City of Camarillo. Agricultural customers within the Camrosa service area will begin receiving recycled water via the RW Interconnection in 2015. Those customers currently use non-potable local surface water delivered via the Conejo Creek Diversion. The cost of private groundwater pumping and the non-potable surface water supply are assumed to remain constant in real terms into the future.

(1) *Complete these columns if dollar value is being claimed for the benefit.*

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project: CamSan/Camrosa Recycled Water Interconnection			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$ 27,499,831			$ 27,499,831
Comments:			

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UWCD Seawater Barrier Pilot Well (SC-9)

Summary

The United Water Conservation District (UWCD), in partnership with the City of Oxnard, is installing a Seawater Barrier Pilot Well in order to reduce seawater intrusion and its damaging effects on the Oxnard Plain aquifers. UWCD will pump 1,500 acre-feet of groundwater per year (AFY) from the easily recharged Oxnard Forebay, where water supplies are plentiful, and inject it through the Seawater Barrier Pilot Well into the less easily recharged aquifers of the Oxnard Plain. Water will be injected for a period of about five years to monitor the effects and benefits of this well in preventing seawater intrusion.

The operation of this pilot well is the first step in the creation of a seawater intrusion barrier on the Oxnard Plain. If results from the pilot well confirm that the wellsite is an appropriate location to slow seawater intrusion, and that the chemistry of groundwater from the shallow supply aquifer is compatible with the deep receiving aquifer, seven additional injection wells will be constructed to create the seawater barrier wellfield to complement the benefits provided by the existing pilot well.

The pilot well also is expected to raise public awareness of the benefits of groundwater injection, potentially paving the way for public acceptance of use of recycled water for injection. The recycled water will be produced by the City of Oxnard's Advanced Water Purification Facility (AWPF), where it will be treated to an advanced level using reverse osmosis technology. If it is determined that injecting high quality recycled water is feasible and acceptable to the public, water injected will be 50 percent groundwater and 50 percent recycled water. This mixture will be injected into the well for the remainder of the well's assumed 25-year lifetime and will allow the City of Oxnard to gain credits for injection of recycled water. These credits can be used to pump groundwater which will still originate from the Oxnard Forebay. Recycled water injection will allow the City of Oxnard to meet its demand growth with credits from injection of recycled water rather than increasing its use of SWP water.

A summary of all benefits and costs of the project is provided in Table 17. Project costs and water supply benefits are discussed in the remainder of this attachment.

Table 17: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$5,564,673
Monetizable Benefits	
Water Supply Benefits	
Avoided Imported Water Supply Costs for Agricultural Pumpers	$2,028,613
Avoided Imported Water Supply Costs for City of Oxnard	$7,643,442
Total Monetizable Benefits	$9,672,055
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Increased Water Supply Reliability for Mutual Water Companies	+
Water Quality or Other Benefits	
Improved Groundwater Quality	++
Provide Data on Water Quality Compatibilities	+
Reduced CO_2 Emissions	+
Reduced Stress on Bay-Delta	+
Protection of Agriculture	++

Notes:

O&M = operations and maintenance.

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.

– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Costs

The budgeted costs for the Seawater Barrier Pilot Well total $1,150,000. This includes the cost of well construction and wellsite easements. The Seawater Barrier Pilot Well will be constructed over the period July 2011 to July 2012. Operations and maintenance costs associated with the Seawater Barrier Pilot Well are expected to total $206,000 per year over years 1 through 5 of the well's expected 25-year lifetime. O&M costs include the cost of well operation, data collection and monitoring, and periodic replacement of equipment at the pilot well, as well as the cost of potable water production, which is estimated to be $80.85 per acre-foot (AF). The present value of capital and O&M costs for the first 5 years of operation of the well total $1,779,063.

If results of the Seawater Barrier Pilot Well testing are favorable, the pilot well is expected to continue to inject water over the remainder of its assumed 25-year lifetime. Costs of recycled water production are apportioned to the seawater barrier pilot well using the ratio of yearly amount of recycled water to be injected by the pilot well under the full scale seawater barrier to the overall amount of water to be produced at the City of Oxnard's AWPF.

The total capital cost of the City of Oxnard's AWPF is $65 million. This plant will produce 28,000 AFY of recycled water, of which 750 AFY will be injected into the well. Thus, the share of recycled water capital cost assigned to the continued operation of the Seawater Barrier Pilot Well is 2.68 percent. The capital costs apportioned to the continued operation of the pilot well with recycled water injection total $1,741,071. These additional capital costs are entered in 2011, which is the year in which the AWPF construction will be completed. O&M cost of recycled water and groundwater production totals $293,138 per year for continued operation of the well during years 6 through 25 of the well's useful lifetime. This includes the variable cost of recycled water production at the AWPF, which is estimated to be $250 per AF and the variable cost of groundwater production which is estimated to be $80.85 per AF [(750 AF * $250/AF) + (750 AF * $80.85/AF) = $248,138]. Also included are $20,000 per year in well operation costs, $20,000 per year in data collection and monitoring costs, and $5,000 per year in periodic replacement costs. O&M costs for continued operation of the well are entered starting in the year 2017, when injection with recycled water will begin.

The total present value of capital construction costs for both the first 5 years of the well and the remaining 20 years of operation are $2,556,322. The total present value O&M costs throughout the well's useful life are $3,008,351. The combined present value capital construction and O&M costs are $5,564,673.

The "Without Project" Baseline

Agricultural Pumpers on Oxnard Plain

Groundwater overdraft on the Oxnard Plain has been causing seawater to intrude into aquifers since the 1950s. Today, the groundwater overdraft on the Oxnard Plain is estimated at 26,000 AF per year (UWCD, 2010). The saline intruded land area is estimated to increase by 260 acres every year, moving east along Hueneme Road and north from Naval Base Ventura County - Point Mugu. Without action to reverse the overdraft, seawater intrusion will continue. At some point (probably during the next major drought), water pumped from groundwater wells on the Oxnard Plain will have chloride concentrations too high for agricultural use; 120 milligrams per liter (mg/L) is considered an upper limit of chloride concentrations suitable for agriculture. The chloride concentration in some active lower aquifer system production wells on the Oxnard Plain has already exceeded 500 mg/L.

The impact of seawater intrusion on supply availability is resulting in changes for agriculture; farmers on the Oxnard Plain are monitoring high chloride levels and some agencies, including the Pleasant Valley County Water District (PVCWD) are currently seeking alternate water supplies to their groundwater wells. In addition, during a severe drought, the rate of seawater intrusion increases significantly and the concentration of chlorides in groundwater will increase even more drastically. UWCD expects that during a severe drought, farmers on the Oxnard Plain will seek new water sources to replace groundwater pumping that is no longer feasible for agriculture due to high chlorides. The return interval for major droughts affecting the Oxnard Plain is assumed to be once every 20 years. By taking the midpoint of a 20 year return interval, or 10 years, and adding it to 2011, it assumed for purposes of this analysis that the next major drought will arrive in 2021.

When farmers seek a replacement water source, it is expected that farmers will ask UWCD and/ or nearby PVWCD for additional water, who in turn will ask the Casitas Municipal Water District and/or the City of Ventura to sell some of their unused State Water Project (SWP) allocation. In 2009, it was estimated that it would cost UWCD $968 per AF to buy the right to Casitas' or Ventura's unused allocation. Moreover, in order to receive water from UWCD, these agricultural pumpers will need to build lateral connections to a UWCD or PVCWD pipeline. The costs associated with building the lateral and purchasing this water are described in the water supply benefits section.

The high costs and significant environmental and political hurdles to delivering SWP water to the farmers, and the continued reliability and supply challenges with the SWP, render this alternate supply an expensive, complicated, and highly unreliable water source. Ultimately, seawater intrusion on the Oxnard Plain could render this extremely productive farmland unusable for agricultural purposes.

City of Oxnard

The City of Oxnard has three sources of potable water: SWP water delivered via Calleguas Municipal Water District (Calleguas), groundwater through UWCD's Oxnard-Hueneme System, and its own groundwater wells (UWCD, 2008).

In addition to its three water sources, the City of Oxnard's Groundwater Recharge Enhancement and Treatment (GREAT) program utilizes recycled water to meet some city water demands and to exchange recycled water for groundwater credits from agricultural users. In 2010, the City of Oxnard was projected to meet about 40 percent of its water demand from Calleguas, 13 percent from UWCD's Oxnard-Hueneme System, 26 percent from its own wells, and 20 percent from the GREAT program (City of Oxnard 2006). After 2010, the City of Oxnard wishes to meet more of its growing water needs through additional water produced by the GREAT program while reducing the water bought from Calleguas, its most expensive source of water (City of Oxnard, 2006).

Without the full-scale seawater barrier project in which the City of Oxnard injects highly treated recycled water, the City of Oxnard will require an additional 750 AF of SWP water each year from Calleguas from 2017 to 2036. Injection of highly treated recycled water allows the City of Oxnard to gain pumping credits which aalows them to pump groundwater and avoid SWP purchases. The costs associated with purchasing this water are described in the water supply benefits section below.

Mutual Water Companies on the Oxnard Plain

Without the project, three small mutual water companies served by UWCD's Oxnard-Hueneme System will remain without a satisfactory emergency water supply. The Dempsey Road Mutual Water Company serves 332 people through 79 connections, the Cypress Mutual Water Company serves 455 people through 91 connections, and the Saviers Road Mutual Water Company serves 900 people through 300 connections. Ground-water wells on this part of the Oxnard Plain are not feasible, especially for municipal supply, because of seawater intrusion. Currently, if there is a service interruption on the Oxnard-Hueneme System, the emergency water supply for these mutual water companies is a fire hose connection to City of Oxnard hydrants. Water is provided via the fire hose until the outage can be repaired. Outages occur approximately once per year and last one to two days before water service can be restored.

Water Supply Benefits

This section describes the water supply benefits generated by the project, including the avoided imported water supply costs for the City of Oxnard and agricultural pumpers on the Oxnard Plain, and the emergency water supply provided by the well for three small mutual water companies on the southern portion of the Oxnard Plain.

Avoided Imported Water Supply Costs for Agricultural Pumpers

Throughout the 25-year life of the project, the current 26,000 AF groundwater overdraft on the Oxnard Plain will be reduced by the 1,500 AF injected each year. This should reduce the area of yearly seawater intrusion beginning in 2012, with an even greater impact when the major drought is assumed to occur in 2021. The amount of seawater intrusion that can be prevented by the pilot well is estimated to be 15 acres each year. This rate was calculated using the ratio of water injected into the seawater barrier to the total overdraft, and multiplying the result by the current loss of acreage because of seawater intrusion [(1,500 AF not injected / 26,000 AF over-draft)*260 acres seawater intrusion per year = 15 additional acres per year]. Beginning in 2021, it is assumed that 15 acres are not lost to seawater intrusion each year due to the 1,500 AFY of recycled water/groundwater injected as a result of this project. The area not lost to seawater intrusion increases by 15 acres each year until the useful life of the well ends in 2036.

Without the Seawater Barrier Pilot Well, agricultural pumpers on the Oxnard Plain will decide at some point to find another source of water or cease farming their land entirely. One potentially viable source of water will be to build a lateral connection to UWCD's Oxnard-Hueneme System and have UWCD buy the rights to some of Casitas Municipal Water District's and/or the City of Ventura's unused SWP allocation. In 2009, it was estimated that it would cost UWCD $968 per AF to buy the right to Casitas' or Ventura's unused allocation.

It is assumed that the agricultural pumpers will not try to acquire more water and will not require a lateral connection until about half the 200-acre area of an average size farm on the Oxnard Plain or 100 acres has been lost to seawater intrusion. A lateral connection is assumed to be reqiored in about 7 years (100 acres/ 15 acres per year) after the drought in 2021, therefore a lateral connection will be built in 2027. Thus, only one lateral will need to be built during the 25-year useful life of the well. A lateral, which is able to serve two average-sized farms, is estimated to cost $300,000 (Kentosh, 2010). In 2009 dollars, the present value of a lateral constructed in 2027 is $105,000.

Assuming a typical agricultural duty factor of 2.5 feet of applied water per acre, 262.5 AF of water (105 acres*2.5 feet of applied water) will not be imported in 2027 because of the continued operation of the pilot well. Assuming the real cost increases by 2.5 percent each year from the 2009 cost of $968 per AF, in 2027, the first year that agricultural pumpers, who had formerly used groundwater, request water from UWCD, the price will be $1,510 per AF. During 2027 to 2036, taking into account the additional 15 acres not lost to seawater intrusion each year, 4,313 AF of water is not imported because of the project. In 2009 dollars, the present value of agricultural pumpers' avoided water supply costs is $1,923,613. When combined with the present value of $105,000 for the avoided lateral construction costs in 2027, the total present value of agricultural pumpers' avoided costs is $2,028,613.

Avoided Imported Water Supply Cost for the City of Oxnard

As discussed earlier, assuming that use of recycled water is approved for the full-scale Seawater Barrier Pilot Well, the City of Oxnard will gain credits for injection of recycled water. These credits can be used to pump groundwater from aquifers with ample supply in the Oxnard Forebay, and will allow the City of Oxnard to a portion of meet its demand with groundwater rather than SWP water.

There are no credits gained during years 1 through 5 of the Seawater Barrier Pilot Well because the injected water is groundwater transferred from the Oxnard Forebay. However, in years 6 through 25, 750 AF of the 1,500 AF injected is expected to be high quality recycled water produced by the City of Oxnard's AWPF. For injecting 750 AFY of recycled water into the

Oxnard Plain, the Fox Canyon Groundwater Management Agency will allow the City of Oxnard to pump 750 AF of groundwater Oxnard from the Oxnard Forebay.

SWP water is the City of Oxnard's most expensive source, so with the 750 AF of groundwater that the City of Oxnard will have available for its use beginning in 2017 because of the project, the City of Oxnard will reduce the amount of SWP water it would have otherwise purchased from Calleguas. This 750 AFY is available to the City of Oxnard for the 20 years that recycled water is injected into the well; in total, the City of Oxnard will reduce its future demand for SWP water by 15,000 AF.

To estimate future Calleguas water rates, it was assumed that Calleguas will continue to deliver a combination of 90 percent Tier 1 water from Metropolitan Water District of Southern California (Metropolitan) (which sells wholesale water to Calleguas for distribution to various entities in Ventura County) and 10 percent Tier 2 water (which is charged at a higher rate). When combined with Calleguas capital improvements and O&M charges, Calleguas' average water rate currently amounts to $923 per AF in 2009 dollars. Based on historical water rates, it is assumed that Calleguas' water rates will increase each year (throughout the well's useful life) at a rate of 2.5 percent above inflation. This increase reflects real investments made by Metropolitan to maintain and improve physical and natural capital assets (i.e., to enhance Metropolitan's infrastructure and water portfolio, respectively).

In 2017, the first year that recycled water will be injected into the Seawater Barrier Pilot Well, the price for Calleguas water is projected to be $1,097 per AF in 2009 dollars. Over the 20 years of recycled water injection, in 2009 dollars, the present value of the City of Oxnard's avoided water supply costs is $7,643,442.

Improved Water Supply Reliability for Mutual Water Companies

Customers served by the Dempsey Road Mutual Water Company, Cypress Mutual Water Company, and Saviers Road Mutual Water Company currently use a fire hose connection to City of Oxnard fire hydrant as their emergency water supply if there is an outage on the Oxnard-Hueneme System. Outages occur approximately once per year, and are one to two days in duration. With the project, water stored in the aquifer by injection from the pilot well can be recovered and delivered via the UWCD's Oxnard-Hueneme System to the mutual water companies. The pilot well will be used as an emergency supply for the mutual water companies. The backup supply will not affect the frequency of outages but will affect their duration. It will take a short amount of time for staff to change the valves, start up chlorination, and turn on the well. Therefore, it is estimated that customers will have water service restored in a few hours rather than in one to two days.

A recent study in Australia surveyed water customers and found that water utility customers were willing to pay by means of an increase in their yearly water bill to reduce the frequency and duration of outages. The marginal willingness to pay to reduce the duration of outages lasting 24 hours was $2.77 per household per year in 2009 U.S. dollars (Hensher et al., 2005). When multiplied by the 470 households served by the three mutual water companies, this amounts to a total willingness to pay $1,302 per year, or $14,813 in present value over the 25-year life of the well. However, due to the lack of match between the outage durations listed in this study to the average duration of outage for the mutual water companies (36 hours), and due to uncertainties about direct transferability of this study to the current situation, this benefit is not claimed in the benefit tables for this analysis. This value is included here to show the potential magnitude of this benefit.

Distribution of Project Benefits and Identification of Beneficiaries

There will be local, regional, and statewide benefits due to the Seawater Barrier Pilot Well as summarized in Table 18. Assuming continued operation of the well over the well's 25-year life by injecting a mixture of recycled water and groundwater, the City of Oxnard will benefit by reducing its demand for water from Calleguas, thus avoiding the costs associated with importing water from the SWP. Likewise, some agricultural pumpers on the Oxnard Plain, through UWCD, will not need to buy Casitas' or Ventura's unused SWP allocation in order to replace lost groundwater supply due to high chlorides. Also, the well will help the three small mutual water companies on the Oxnard Plain (the Dempsey Road Mutual Water Company, Cypress Mutual Water Company, and Saviers Road Mutual Water Company) because they will now have a satisfactory emergency water source. There will also be statewide benefits as lower demands are placed on water from the San Francisco Bay-Delta Region via the SWP.

Table 18: Project Beneficiaries Summary

Local	Regional	Statewide
City of Oxnard	United Water Conservation District	San Francisco Bay-Delta
Agricultural Pumpers on Oxnard Plain	Calleguas Municipal Water District	
Dempsey Road Mutual Water Company	Metropolitan Water District of Southern California	
Cypress Mutual Water Company		
Saviers Road Mutual Water Company		

Project Benefits Timeline Description

Starting from construction completion in 2012, the Seawater Barrier Pilot Well will be able to function as an emergency water supply to the three mutual water companies. Water supply benefits will accrue to the City of Oxnard from 2017 to 2036 and to the agricultural pumpers from 2027 to 2036. The well's projected useful life ends in 2036, 25 years after well operation begins in 2012.

Potential Adverse Effects from the Project

Under the California Environmental Quality Act (CEQA), an Environmental Impact Report (EIR) was prepared by the City of Oxnard for the GREAT program, including the Seawater Barrier Pilot Well (SCH #2003011045). The EIR was adopted by Oxnard on 14 September 2004. The EIR did not identify any adverse effects from this project.

Summary of Findings

Over the 25 years of the Seawater Barrier Pilot Well's projected useful life, the City of Oxnard will reduce its demand for SWP water by 15,000 AF, while agricultural pumpers reduce their demands by 4,313 AF. The City of Oxnard benefits from 2017 to 2036; in 2009 dollars, the present value of these benefits is $7,643,442. The agricultural pumpers benefit from 2027 to 2036; in 2009 dollars, the present value of these benefits is $1,923,613. The total present value of the City of Oxnard's and agricultural pumpers' avoided SWP water costs is $9,567,055.

The project also provides non-monetized benefits to three small mutual water companies as summarized in Table 19 because the pilot well and the water injected through the well can serve as a satisfactory emergency water supply.

Table 19: Qualitative Benefits Summary – Water Supply

Benefit	Qualitative Indicator*
Emergency water supply for three mutual water companies	+

Note:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. These issues are listed in Table 20.

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Table 20: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Injection of groundwater and/or recycled water not feasible	– –	Whether due to water quality incompatibilities or lack of public support, not being able to inject 1,500 AF of groundwater in the first 5 years of the well, and a mix of high quality recycled water and groundwater for the remainder of the well's useful life will decrease net benefits significantly.
Major drought timing	U	It was assumed that the next drought will occur in 2021, but it could occur before or after this date. If the next major drought does not occur in 2021, it will have a more than moderate impact on net benefits. The direction of the impact will depend on whether the drought occurs before or after 2021.
Alternate source for agricultural pumpers	++	When comparing this project to the "without project" baseline, it was assumed that agricultural pumpers will find an alternate water source when the reduction in the saline intruded area becomes larger than half of a 200 acre farm (or 100 acres). Depending on when agricultural pumpers decided to invest in an alternate water source, their actions will modestly increase or decrease net benefits. Additionally, the alternative water source may prove to be infeasible or unreliable, in which case the benefits will be substantially higher, as failure to prevent seawater intrusion into the Oxnard Plain and failure to procure an alternate water source could result in the elimination of agricultural activity in this highly-productive farmland.
Longer lifetime of well or AWPF	+	A lifetime longer than 25 years for either the well or AWPF will cause net benefits estimated for the well to be higher. It is possible that both lifetimes could be higher.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:
* Direction and magnitude of effect on net benefits:
+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

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Personal communication. December 2010. United Water Conservation District, Kentosh, Jim.

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Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project: UWCD Seawater Barrier Pilot Well									
	Initial Costs	Operations and Maintenance Costs [1]						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009	$0	$0	$0	$0	$0	$0	$0	1.000	$0
2010	$0	$0	$0	$0	$0	$0	$0	0.943	$0
2011	$2,556,456	$0	$0	$0	$0	$0	$2,556,456	0.890	$2,275,246
2012	$334,615	$36,180	$126,630	$38,190	$5,000	$0	$540,615	0.840	$454,117
2013	$0	$36,180	$126,630	$38,190	$5,000	$0	$206,000	0.792	$163,152
2014	$0	$36,180	$126,630	$38,190	$5,000	$0	$206,000	0.747	$153,882
2015	$0	$36,180	$126,630	$38,190	$5,000	$0	$206,000	0.705	$145,230
2016	$0	$36,180	$126,630	$38,190	$5,000	$0	$206,000	0.665	$136,990
2017	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.627	$183,798
2018	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.592	$173,538
2019	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.558	$163,571
2020	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.527	$154,484
2021	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.497	$145,690
2022	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.469	$137,482
2023	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.442	$129,567
2024	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.417	$122,239
2025	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.394	$115,496
2026	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.371	$108,754
2027	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.35	$102,598
2028	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.331	$97,029
2029	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.312	$91,459
2030	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.294	$86,183
2031	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.278	$81,492
2032	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.262	$76,802
2033	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.247	$72,405
2034	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.233	$68,301
2035	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.22	$64,490
2036	$0	$51,865	$181,527	$54,746	$5,000	$0	$293,138	0.207	$60,680
Project Life	25 years							…	
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$5,564,673

Comments: Costs shown incorporate both the budgeted costs for the Seawater Barrier Pilot Well for the first 5 years of its assumed 25-year life, and the costs apportioned to the well from the AWPF for injection of a mix of groundwater and recycled water over the remainder of the well's assumed life. The budgeted costs for the Seawater Barrier Pilot Well total $1,150,000. The Seawater Barrier Pilot Well will be constructed over the period July 2011 to July 2012. O&M costs for the fiirst 5 years of well operation total $206,000. Costs of recycled water production are apportioned to the well using the ratio of yearly amount of recycled water to be injected by the pilot well under the full scale seawater barrier to the overall amount of water to be produced at the City of Oxnard's AWPF. The capital costs apportioned to the continued operation of the pilot well with recycled water injection total $1,741,071. These additional capital costs are entered in 2011, which is the year AWPF construction will be completed. O&M cost of recycled water and groundwater production totals $293,138 per year for continued operation of the well during years 6-25 of the well's useful lifetime. O&M costs for continued operation of the well are entered in 2017, when injection with recycled water will begin.

(1) The incremental change in O&M costs attributable to the project.

Table 12 - Annual Water Supply Benefits
(All benefits should be in 2009 dollars)
Project: UWCD Seawater Barrier Pilot Well

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g) (1)	(i) Discount Factor (1)	(j) Discounted Benefits (h) x (i) (1)
2009								1.000	
2010								0.943	
2011								0.890	
2012								0.840	
2013								0.792	
2014								0.747	
2015								0.705	
2016								0.665	
2017	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,097	$822,479	0.627	$515,694
2018	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,124	$843,041	0.592	$499,080
2019	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,152	$864,117	0.558	$482,177
2020	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,181	$885,720	0.527	$466,774
2021	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,210	$907,863	0.497	$451,208
2022	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,241	$930,560	0.469	$436,432
2023	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,272	$953,823	0.442	$421,590
2024	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,304	$977,669	0.417	$407,688
2025	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,336	$1,002,111	0.394	$394,832
2026	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,370	$1,027,164	0.371	$381,078
2027	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,404	$1,052,843	0.350	$368,495
	Avoided SWP water use- agricultural pumpers	acre-feet	0	262.5	262.5	$1,510	$396,375	0.350	$138,731
2028	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,439	$1,079,164	0.331	$357,203
	Avoided SWP water use- agricultural pumpers	acre-feet	0	300	300	$1,548	$464,400	0.331	$153,716
2029	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,475	$1,106,143	0.312	$345,117
	Avoided SWP water use- agricultural pumpers	acre-feet	0	337.5	337.5	$1,586	$535,275	0.312	$167,006
2030	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,512	$1,133,796	0.294	$333,336
	Avoided SWP water use- agricultural pumpers	acre-feet	0	375	375	$1,626	$609,750	0.294	$179,267
2031	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,550	$1,162,141	0.278	$323,075
	Avoided SWP water use- agricultural pumpers	acre-feet	0	412.5	412.5	$1,667	$687,638	0.278	$191,163
2032	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,588	$1,191,195	0.262	$312,093
	Avoided SWP water use- agricultural pumpers	acre-feet	0	450	450	$1,708	$768,600	0.262	$201,373
2033	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,628	$1,220,975	0.247	$301,581
	Avoided SWP water use- agricultural pumpers	acre-feet	0	487.5	487.5	$1,751	$853,613	0.247	$210,842
2034	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,669	$1,251,499	0.233	$291,599
	Avoided SWP water use- agricultural pumpers	acre-feet	0	525	525	$1,795	$942,375	0.233	$219,573
2035	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,710	$1,282,787	0.220	$282,213
	Avoided SWP water use- agricultural pumpers	acre-feet	0	562.5	562.5	$1,840	$1,035,000	0.220	$227,700
2036	Avoided SWP water use - Oxnard	acre-feet	0	750	750	$1,753	$1,314,856	0.207	$272,175
	Avoided SWP water use- agricultural pumpers	acre-feet	0	600	600	$1,886	$1,131,600	0.207	$234,241
Project Life	25 years		0	19,313	19,313			…	
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$9,567,055

Comments: The year 2017 is the first year that a mix of high quality recycled water and groundwater will be injected into the well. For injecting 750 AFY of recycled water into the Oxnard Plain, the Fox Canyon Groundwater Management Agency will allow the City of Oxnard to pump 750 AF of groundwater for Oxnard supply. The City will use the groundwater pumping credits to avoid use of SWP supplies. The price of SWP water from Calleguas is estimated to be $1,097 per AF in 2017, based on 2.5 percent per year real escalation of current rates. The well is estimated to prevent 15 acres of seawater intrusion per year. By the year 2027, enough acreage will have been lost for two average sized farms to pay for a lateral connection to UWCD to make use of SWP supplies purchased from the City of Ventura's or Casitas' unused entitlement. The cost to purchase an unused allocation was estimated to cost $1,510 per AF in 2027 assuming a 2.5 percent real escalation of the cost per year.

Table 13 - Annual Costs of Avoided Projects

(All avoided costs should be in 2009 dollars)

Project: UWCD Seawater Barrier Pilot Well

	Costs				**Discounting Calculations**	
(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**
YEAR	Alternative (Avoided Project Name): Lateral connection to UWCD water pipeline				Discount Factor	Discounted Costs (e) x (f)
	Avoided Project Description: Without the project, agricultural pumpers would need a lateral connection to a UWCD water pipeline in order to have SWP water for irrigation.					
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2027	$300,000			$300,000	0.350	$105,000
Project Life					…	
Total Present Value of Discounted Costs (Sum of Column (g))						$105,000
(%) Avoided Cost Claimed by Project						100%
Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						$105,000

Comments:

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project: UWCD Seawater Barrier Pilot Well			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$9,567,055	$105,000		$9,672,055
Comments:			

Ventura County Waterworks District No. 16 – Piru Treatment Plant Tertiary Upgrade (SC-10)

Summary

The Ventura County Waterworks District (VCWWD) No. 16 Piru Wastewater Treatment Plant (PWWTP) project is to upgrade the PWWTP to allow for the production of up to 560 acre-feet (AF) of recycled water per year.

Under Phase I of the PWWTP Project (completed in February 2010), VCWWD constructed a new secondary wastewater treatment facility in order to meet Regional Water Quality Control Board (RWQCB) discharge requirements. However, the effluent produced from Phase I does not meet the RWQCB's groundwater quality objectives for total dissolved solids (TDS) and chloride, nor does it comply with tertiary treatment requirements for unrestricted use of recycled water. The PWWTP currently treats about 250 acre-feet per year (AFY) of effluent, which is discharged into off-site percolation ponds.

The Piru Treatment Plant Tertiary Upgrade (Piru Tertiary Upgrade) will provide the improvements necessary to produce recycled water from the PWWTP that will be in compliance with Title 22 of the California Code of Regulations for tertiary treatment. As a result, the PWWTP's tertiary-treated effluent (i.e., recycled water) will be made available for use by neighboring nurseries and citrus farmers. This will offset the use of groundwater and local surface water by these customers and prevent further discharge of wastewater effluent to the PWWTP percolation ponds. This phase of the upgrade will help the PWWTP to meet groundwater quality objectives in the vicinity of the off-site percolation ponds.

When the Piru Tertiary Upgrade comes online in 2014, it will produce close to 285 AFY of recycled water. At full PWWTP capacity, 0.5 million gallons per day (mgd) or 560 AFY of recycled water will be made available to agricultural customers for the irrigation of about 600 acres.

A summary of all benefits and costs of the project is provided in Table 21. Project costs and water supply benefits are discussed in the remainder of this attachment.

Table 21: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and O&M	$4,511,997
Monetizable Benefits	
Water Supply Benefits	
Avoided Water Supply Costs to Agricultural Customers	$1,405,031
Avoided Groundwater Well Construction at the PWWTP	$622,800
Water Quality and Other Benefits	
Avoided Wastewater Discharge Fines	$6,287,490
Avoided PWWTP Pipeline Upgrade Costs	$423,000
Avoided Percolation Pond O&M Costs	$161,055
Total Monetizable Benefits	$8,899,376

Qualitative Benefit or Cost	Qualitative Indicator*
Water Supply Benefits	
Increased Water Supply Reliability for Agricultural Customers and the Community of Piru	+
Water Quality Benefits	
Improved Groundwater Quality	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Costs

Capital costs for the project amount to $3,986,841. The budget includes costs to construct the tertiary treatment facility. This includes the cost of 4 acres of land previously purchased for the facility. Operations and maintenance (O&M) costs (including administrative, operations, maintenance, and periodic replacement costs) will average about $134,000 per year. Over the project's 35-year expected useful life, the present value capital and O&M costs will amount to $4,511,997.

The "Without Project" Baseline

The PWWTP, which provides sewage treatment for the Piru Disadvantaged Community, is located within the Santa Clara River Watershed in the Piru groundwater basin. The plant is operated by VCWWD No. 16.

Through operation of the PWWTP, VCWWD provides sewer services to more than 400 households in the community of Piru. Currently, VCWWD treats about 280 AFY of wastewater effluent using a secondary treatment process. Within 20 years, there are expected to be just over 700 households within the service area. At that time, the PWWTP will reach its full capacity with the treatment of 560 AFY of wastewater. Without the project, wastewater effluent at the plant will continue to be discharged to the PWWTP's existing percolation ponds and will not be put to beneficial use.

Agricultural customers in the area currently receive water from three sources: groundwater from the Warring Water Company, diverted surface water from the Piru Mutual Water Company, and groundwater from private wells. Without the Piru Tertiary Upgrade, agricultural users in the area will continue to rely on groundwater and local creek water for irrigation. The groundwater sources are subject to overdraft and water quality degradation, particularly from salts, while surface water availability is dependent on hydrologic conditions, maintenance downtime, and California Department of Fish and Game regulations. Without the project, water supply reliability from both groundwater and surface water sources is anticipated to decrease over time.

Additionally, without the Piru Tertiary Upgrade, VCWWD will need to construct a shallow groundwater well to supply the PWWTP. This well would need to be constructed within the next 10 years.

Water Supply Benefits

This section describes the water supply benefits generated by the Piru Tertiary Upgrade, including avoided water supply costs to local agricultural customers, avoided construction of a groundwater supply well at the PWWTP, and improved water supply reliability for agricultural customers and the community of Piru.

Avoided Water Supply Costs to Agricultural Customers

To calculate the avoided cost of water purchased by agricultural customers over time, the amount of water avoided from each source, each year, is multiplied by the estimated rate charged by the respective companies.[11] Based on the timeline of recycled water production and assuming no real increases in water rates, the total present value benefits associated with the avoided purchase of irrigation water due to the PWWTP project amounts to almost $1.41 million over the 35-year project life. About $1.26 million of this benefit is attributable to avoided purchases of water supplied by the Warring Water Company (groundwater supplied by the Warring Water Company costs $595/AF) compared to $45/AF for water provided by the Piru Mutual Water Company and assumed for private wells. As a result of the Piru Tertiary Upgrade, local agricultural customers will receive recycled water from the PWWTP in lieu of water provided by the Warring Water Company, Piru Mutual Water Company, or private wells. For this analysis, it is assumed that 40 percent of the recycled water from the PWWTP will offset the use of local groundwater supplied by the Warring Water Company. The remainder of recycled water will be used in lieu of non-potable creek water diverted and supplied by the Piru Mutual Water Company or groundwater from private wells.

When the project comes online in 2014, it will enable the use of about 0.28 mgd (317 AFY) of recycled water.[12] The amount of recycled water made available via the PWWTP will continue to increase through 2029 when the plant reaches full capacity of 0.5 mgd (560 AFY). Thus, at full PWWTP capacity, approximately 225 AFY of recycled water will offset the use of water from the Warring Water Company. The remaining 335 AFY will offset water supplied by the Piru Mutual Water Company or from private groundwater wells. Over the life of the project, 17,659 AF of water use will be offset by use of recycled water from the PWWTP.

Avoided Groundwater Well Construction at the PWWTP

The Piru Tertiary Upgrade will allow VCWWD to use recycled water to supply PWWTP operations in addition to its distribution to agricultural customers. As a result, VCWWD will avoid the construction of an onsite, shallow groundwater supply well, which would otherwise be needed within the next 10 years.

VCWWD estimates that the capital costs associated with construction of this well will be about $300,000. In addition, it will cost VCWWD $60,000 per year, on average, to operate and maintain the well (including periodic replacement costs of about $12,000 per year). For this analysis, it is assumed that the well will begin operating in 10 years (2020) and that construction would take approximately 1 year. Based on these assumptions, the total present value of avoided capital and O&M costs associated with the well amount to $622,800 through 2048 (the end of the useful life of the Piru Tertiary Upgrade).

Increased Water Supply Reliability for Agricultural Customers and the Community of Piru

The reliability of a water supply refers to the ability to consistently meet water demands, even in times of drought or other constraints on source water availability. The Piru Tertiary Upgrade will help address reliability issues for agricultural customers dependent on water provided by the Warring Water Company, Piru Mutual Water Company, or private groundwater wells. As noted above, the availability of these supplies can vary based on groundwater levels and quality for groundwater sources and on hydrologic conditions, maintenance downtime, and U.S. Fish and Game regulations for surface water. This project will provide a drought-resistant, dependable supply of recycled water to these customers.

In addition, by reducing demand on local groundwater supplies, the project will increase supply reliability for the community of Piru by

[11] Because no data are available on the amount of groundwater used by the local nursery from private wells, it is assumed that this source of water costs the same (if not more) as water supplied by the Piru Mutual Water Company ($45 per/AF).

[12] Based on an expected increase in wastewater treatment plant capacity from 285 AFY in 2012 to 560 AFY (full capacity) by 2029 (scaled linearly).

increasing the amount of groundwater available for current and future customers, thus reducing the potential for drought-related shortages and reducing the potential for groundwater overdraft.

Although interest in water supply reliability is increasing (e.g., due to increasing water demands and concerns over climate-related events), only a few studies have directly attempted to quantify its value (i.e., through nonmarket valuation studies). The results from these studies indicate that residential and industrial (i.e., urban) customers seem to value supply reliability quite highly. Stated preference studies find that water customers are willing to pay $95 to $500 per household per year for total reliability (i.e., a 0 percent probability of their water supply being interrupted in times of drought).

The challenge for use of these values to determine a value of increased reliability as a result of the Piru Tertiary Upgrade is recognizing how to reasonably interpret these survey-based household monetary values. The values noted above reflect a willingness to pay per household to ensure complete reliability (zero drought-related use restrictions in the future), whereas the Piru Tertiary Upgrade only enhances overall reliability, but does not guarantee 100 percent reliability. Thus, if applied directly to the number of households within the community of Piru, the dollar values from the studies would overstate the reliability value provided by the project. Due to the uncertainty involved in applying these numbers to this situation, this benefit estimate is not included in the tables.

Distribution of Project Benefits and Identification of Beneficiaries

In terms of water supply benefits, the Piru Tertiary Upgrade will benefit stakeholders at the local and regional levels, as summarized in Table 22. At the local level, the community of Piru and agricultural customers will benefit due to increased reliability of supply. VCWWD will also benefit from avoided construction of a groundwater supply well at the PWWTP. Regionally, the Santa Clara River Watershed will benefit from reduced demand on area groundwater supplies. The project also helps meet statewide goals to increase use of recycled wastewater by at least 1 million AFY by 2020 and by at least 2 million AFY by 2030 (State Water Resources Control Board, 2009).

Table 22: Project Beneficiaries Summary

Local	Regional	Statewide
Agricultural Customers Community of Piru (a DAC) VCWWD No. 16	Santa Clara River Watershed	California – Recycled Water Use Goals

Project Benefits Timeline Description

The Piru Tertiary Upgrade is expected to come online in 2014. For this analysis, a 35-year useful project life is assumed, thus benefits and costs are calculated through 2048 (35 years after the project comes online).

Potential Adverse Effects from the Project

Pursuant to the requirements of the California Environmental Quality Act, the County of Ventura Board of Supervisors (Board) certified a Mitigated Negative Declaration for the Piru Secondary WWTP Expansion Project in 2004. In 2008, the Board adopted an Addendum to the Mitigated Negative Declaration for the Piru Secondary WWTP Expansion Project, which also addressed the future Piru Tertiary Upgrade. Based on the Addendum to the Mitigated Negative Declaration, the Piru Tertiary Upgrade will result in no significant adverse environmental effects.

Summary of Findings

The monetized water supply benefits from the project include the avoided costs of agricultural water supply purchases, as well as the avoided costs associated with the construction of an onsite groundwater well to supply PWWTP operations.

The cost of water delivered to agricultural customers by the Warring Water Company and the Piru Mutual Water Company amounts to $595/AF and $45/AF, respectively in 2009 dollars. The avoided water supply costs from both sources total $1.41 million in present value in 2009 dollars over the 35-year life of the project. The project will also result in avoided groundwater well construction costs that total $622,800 in present value. In addition, the project will result in improved water supply reliability for agricultural customers, the community of Piru, and the region as a whole.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In most cases, omissions lead to a downward bias in benefits: the project is expected to be much more beneficial than the subset of benefits that can be monetized indicates. These issues are listed in Table 23.

Table 23: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Increased Water Supply Reliability	+	The potential benefit of increased water supply reliability as a result of the project has not been included due to uncertainties of applying values from the literature to a partial improvement in water supply reliability.
Avoided Groundwater Supply Construction Costs	+	The timing of the construction of this well is uncertain. However, VCWWD knows that this well will be needed within the next 10 years. For this analysis it is assumed that the well is completed 10 years from now. This benefit would be higher if the well is constructed sooner due to increased discounting of costs over time.
Avoided Water Supply Costs to Agricultural Customers	U	It is uncertain how much groundwater from private wells will be offset by the project and how much it will cost to pump the groundwater. For this analysis, it is assumed that private groundwater costs the same as water supplied by the Piru Mutual Water Company ($45/AF). This is likely a conservative estimate; however, this is not known for certain.
Project Costs	U	The calculation of the present value of costs is a function of the timing of capital outlays and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

Recycled Water Policy. 2009. State Water Resources Control Board. California Environmental Protection Agency. Available: http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf.

Table 11- Annual Cost of Project

(All costs should be in 2009 Dollars)

Project: Ventura County Waterworks District (VCWWD) No. 16 - Piru Treatment Plant Tertiary Upgrade

	Initial Costs	Operations and Maintenance Costs [1]						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009							$0	1.00	$0
2010							$0	0.943	$0
2011	$ 396,841						$396,841	0.890	$353,188
2012	$ 970,000						$970,000	0.840	$814,800
2013	$ 2,620,000						$2,620,000	0.792	$2,075,040
2014		$10,082	$33,608	$23,526	$8,738		$75,954	0.747	$56,738
2015		$10,596	$35,321	$24,725	$9,184		$79,826	0.705	$56,277
2016		$11,110	$37,034	$25,924	$9,629		$83,698	0.665	$55,659
2017		$11,624	$38,748	$27,123	$10,074		$87,569	0.627	$54,906
2018		$12,138	$40,461	$28,322	$10,520		$91,441	0.592	$54,133
2019		$12,652	$42,174	$29,522	$10,965		$95,313	0.558	$53,184
2020		$13,166	$43,887	$30,721	$11,411		$99,184	0.527	$52,270
2021		$13,680	$45,600	$31,920	$11,856		$103,056	0.497	$51,219
2022		$14,194	$47,313	$33,119	$12,301		$106,928	0.469	$50,149
2023		$14,708	$49,026	$34,318	$12,747		$110,799	0.442	$48,973
2024		$15,222	$50,739	$35,518	$13,192		$114,671	0.417	$47,818
2025		$15,736	$52,452	$36,717	$13,638		$118,542	0.394	$46,706
2026		$16,250	$54,166	$37,916	$14,083		$122,414	0.371	$45,416
2027		$16,764	$55,879	$39,115	$14,528		$126,286	0.350	$44,200
2028		$17,278	$57,592	$40,314	$14,974		$130,157	0.331	$43,082
2029		$17,791	$59,305	$41,513	$15,419		$134,029	0.312	$41,817
2030		$17,791	$59,305	$41,513	$15,419		$134,029	0.294	$39,405
2031		$17,791	$59,305	$41,513	$15,419		$134,029	0.278	$37,260
2032		$17,791	$59,305	$41,513	$15,419		$134,029	0.262	$35,116
2033		$17,791	$59,305	$41,513	$15,419		$134,029	0.247	$33,105
2034		$17,791	$59,305	$41,513	$15,419		$134,029	0.233	$31,229
2035		$17,791	$59,305	$41,513	$15,419		$134,029	0.220	$29,486
2036		$17,791	$59,305	$41,513	$15,419		$134,029	0.207	$27,744
2037		$17,791	$59,305	$41,513	$15,419		$134,029	0.196	$26,270
2038		$17,791	$59,305	$41,513	$15,419		$134,029	0.185	$24,795
2039		$17,791	$59,305	$41,513	$15,419		$134,029	0.174	$23,321
2040		$17,791	$59,305	$41,513	$15,419		$134,029	0.164	$21,981
2041		$17,791	$59,305	$41,513	$15,419		$134,029	0.155	$20,775
2042		$17,791	$59,305	$41,513	$15,419		$134,029	0.146	$19,568
2043		$17,791	$59,305	$41,513	$15,419		$134,029	0.138	$18,496
2044		$17,791	$59,305	$41,513	$15,419		$134,029	0.130	$17,424
2045		$17,791	$59,305	$41,513	$15,419		$134,029	0.123	$16,486
2046		$17,791	$59,305	$41,513	$15,419		$134,029	0.116	$15,547
2047		$17,791	$59,305	$41,513	$15,419		$134,029	0.109	$14,609
2048		$17,791	$59,305	$41,513	$15,419		$134,029	0.103	$13,805
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$4,511,997

Comments:

(1) The incremental change in O&M costs attributable to the project.

Table 12 - Annual Water Supply Benefits (All benefits should be in 2009 dollars) Project: Ventura County Waterworks District (VCWWD) No. 16 - Piru Treatment Plant Tertiary Upgrade									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g) (1)	Discount Factor (1)	Discounted (h) x (i) (1)
2009							$0	1.00	$0
2010							$0	0.943	$0
2011							$0	0.890	$0
2012							$0	0.840	$0
2013							$0	0.792	$0
2014	Avoided agricultural water supply costs	AF	0	317	317	$265	$84,099	0.747	$62,822
2015	Avoided agricultural water supply costs	AF	0	334	334	$265	$88,385	0.705	$62,312
2016	Avoided agricultural water supply costs	AF	0	350	350	$265	$92,672	0.665	$61,627
2017	Avoided agricultural water supply costs	AF	0	366	366	$265	$96,959	0.627	$60,793
2018	Avoided agricultural water supply costs	AF	0	382	382	$265	$101,246	0.592	$59,937
2019	Avoided agricultural water supply costs	AF	0	398	398	$265	$105,532	0.558	$58,887
2020	Avoided agricultural water supply costs	AF	0	414	414	$265	$109,819	0.527	$57,875
2021	Avoided agricultural water supply costs	AF	0	431	431	$265	$114,106	0.497	$56,711
2022	Avoided agricultural water supply costs	AF	0	447	447	$265	$118,393	0.469	$55,526
2023	Avoided agricultural water supply costs	AF	0	463	463	$265	$122,679	0.442	$54,224
2024	Avoided agricultural water supply costs	AF	0	479	479	$265	$126,966	0.417	$52,945
2025	Avoided agricultural water supply costs	AF	0	495	495	$265	$131,253	0.394	$51,714
2026	Avoided agricultural water supply costs	AF	0	511	511	$265	$135,540	0.371	$50,285
2027	Avoided agricultural water supply costs	AF	0	528	528	$265	$139,826	0.350	$48,939
2028	Avoided agricultural water supply costs	AF	0	544	544	$265	$144,113	0.331	$47,701
2029	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.312	$46,301
2030	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.294	$43,630
2031	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.278	$41,255
2032	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.262	$38,881
2033	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.247	$36,655
2034	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.233	$34,577
2035	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.220	$32,648
2036	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.207	$30,719
2037	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.196	$29,086
2038	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.185	$27,454
2039	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.174	$25,822
2040	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.164	$24,338
2041	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.155	$23,002
2042	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.146	$21,666
2043	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.138	$20,479
2044	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.130	$19,292
2045	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.123	$18,253
2046	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.116	$17,214
2047	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.109	$16,176
2048	Avoided agricultural water supply costs	AF	0	560	560	$265	$148,400	0.103	$15,285
Project Life				17,659	17,659				
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$1,405,031
Comments: The unit value for avoided agricultural water supply costs shown in Column G represents the weighted average cost of water supplied by Piru Mutual Water Company and Warring Water Company. For this analysis, it is assumed that 40% of the recycled water from the PWWTP will offset the use of local groundwater supplied by the Warring Water Company. The remainder of recycled water will be used in lieu of non-potable creek water diverted and supplied by the Piru Mutual Water Company or groundwater from private wells. Groundwater supplied by the Warring Water Company costs $595/AF compared to $45/AF for water provided by the Piru Mutual Water Company and assumed $45/AF for private wells.									

(1) Complete these columns if dollar value is being claimed for the benefit.

Table 13 - Annual Costs of Avoided Projects

(All avoided costs should be in 2009 dollars)

Project: Ventura County Waterworks District (VCWWD) No. 16 - Piru Treatment Plant Tertiary Upgrade

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
YEAR	Alternative (Avoided Project Name): ________________ *Avoided Project Description: Without the project, an on-site groundwater supply well will need to be constructed to supply Piru Treatment Plant operations*				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2009				$ -	1.00	$ -
2010				$ -	0.943	$ -
2011				$ -	0.890	$ -
2012				$ -	0.840	$ -
2013				$ -	0.792	$ -
2014				$ -	0.747	$ -
2015				$ -	0.705	$ -
2016				$ -	0.665	$ -
2017				$ -	0.627	$ -
2018				$ -	0.592	$ -
2019	$ 300,000			$ 300,000	0.558	$ 167,400
2020			$ 60,000	$ 60,000	0.527	$ 31,620
2021			$ 60,000	$ 60,000	0.497	$ 29,820
2022			$ 60,000	$ 60,000	0.469	$ 28,140
2023			$ 60,000	$ 60,000	0.442	$ 26,520
2024			$ 60,000	$ 60,000	0.417	$ 25,020
2025			$ 60,000	$ 60,000	0.394	$ 23,640
2026			$ 60,000	$ 60,000	0.371	$ 22,260
2027			$ 60,000	$ 60,000	0.350	$ 21,000
2028			$ 60,000	$ 60,000	0.331	$ 19,860
2029			$ 60,000	$ 60,000	0.312	$ 18,720
2030			$ 60,000	$ 60,000	0.294	$ 17,640
2031			$ 60,000	$ 60,000	0.278	$ 16,680
2032			$ 60,000	$ 60,000	0.262	$ 15,720
2033			$ 60,000	$ 60,000	0.247	$ 14,820
2034			$ 60,000	$ 60,000	0.233	$ 13,980
2035			$ 60,000	$ 60,000	0.220	$ 13,200
2036			$ 60,000	$ 60,000	0.207	$ 12,420
2037			$ 60,000	$ 60,000	0.196	$ 11,760
2038			$ 60,000	$ 60,000	0.185	$ 11,100
2039			$ 60,000	$ 60,000	0.174	$ 10,440
2040			$ 60,000	$ 60,000	0.164	$ 9,840
2041			$ 60,000	$ 60,000	0.155	$ 9,300
2042			$ 60,000	$ 60,000	0.146	$ 8,760
2043			$ 60,000	$ 60,000	0.138	$ 8,280
2044			$ 60,000	$ 60,000	0.130	$ 7,800
2045			$ 60,000	$ 60,000	0.123	$ 7,380
2046			$ 60,000	$ 60,000	0.116	$ 6,960
2047			$ 60,000	$ 60,000	0.109	$ 6,540
2048			$ 60,000	$ 60,000	0.103	$ 6,180
Total Present Value of Discounted Costs (Sum of Column (g))						$ 622,800
(%) Avoided Cost Claimed by Project						
Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						

Comments: The project will allow VCWWD to use recycled water to supply PWWTP operations. As a result, VCWWD will avoid the construction of an on-site, shallow groundwater supply well, which would be needed within the next 10 years. VCWWD estimates that the capital costs associated with construction of this well will be about $300,000. In addition, it will cost VCWWD $60,000 per year, on average, to operate and maintain the well (including periodic replacement costs of about $12,000 per year). For this analysis, it is assumed that the well will begin operating in 10 years (2020) and that construction would take approximately 1 year.

Table 15. Total Water Supply Benefits (All benefits should be in 2009 dollars)			
Project: Ventura County Waterworks District (VCWWD) No. 16 - Piru Treatment Plant Tertiary Upgrade			
Total Discounted Water Supply Benefits (a)	Total Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Present Value of Discounted Benefits (d) (a) + (c) or (b) + (c)
$ 1,405,031	$ 622,800		$ 2,027,831

Comments: The project will avoid the use of local groundwater by agricultural and landscape irrigation customers, as well as the construction of a groundwater supply well at the Piru Wastewater Treatment Plant (PWWTP). With the project, some of the recycled water produced at the PWWTP will be used for PWWTP operations. Without the project, VCWWD would have to construct a groundwater well to supply plant operations. Additionally, agricultural users would continue to use a combination of groundwater from Warring Water Company and private wells and surface water from Piru Mutual Water Company. Thus, without the project, both costs would be incurred. This is not a double counting of benefits.

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The Nature Conservancy Natural Floodplain Protection Program (SC-7)

Summary

The Nature Conservancy (TNC) is planning to implement the Natural Floodplain Protection Program (NFPP). This program will preserve critical sections of the remaining undeveloped 500-year floodplain in the Santa Clara River Watershed (Watershed) in Ventura County by establishing a Floodplain Conservation Zone. TNC will acquire private property easements as a means to preclude future development, preserving highly productive farmland and riparian habitat along the Santa Clara River, and preventing urban development in the floodplain that leads to levee building, degraded floodplain functioning and habitat, and increased downstream flood damage.

The project is the first step in a stakeholder initiative organized under the Floodplain Working Group (FWG), which includes representatives from the Ventura County Watershed Protection District (VCWPD), Ventura County Farm Bureau (Farm Bureau), Ventura County Resource Conservation District (VCRCD), Natural Resources Conservation Service (NRCS), and TNC. The NFPP targets acquisition of 225 acres of easement of the approximately 4,100 total acres in the 500-year floodplain of the Watershed. TNC anticipates that with acquisition of sufficient easements in key areas of the 500-year floodplain, the risk of development on the remaining lands will be substantially reduced, and therefore it will not be necessary to acquire easements across the entire floodplain. Ultimately, TNC hopes to establish conservation easements to protect the 80 percent of the floodplain that is likely to be developed (approximately 3,280 acres) starting with the 225 acres targeted under this initial step. The benefits from protection will increase over time as additional are acquired in the future.

A summary of all benefits and costs of the project is provided in Table 24. Project costs and water supply benefits are discussed in the remainder of this attachment.

Table 24: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and Operations and Maintenance	$3,786,300
Monetizable Benefits	
Flood Control Benefits	
Avoided Downstream Flood Damage	$9,902,622
Total Monetizable Benefits	$9,902,622
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Avoided Loss of Groundwater Recharge	+
Water Quality and Other Benefits	
Maintain Protected Riparian Habitat	++
Avoided Degradation of Water Quality	+
Provide Wetland and Riparian Habitats	++
Recovery of Endangered Southern Steelhead	++
Protect Farmland from Development	++
Provide Educational and Recreational Opportunities	+
Flood Control Benefits	
Avoided Construction Cost of New Levees	++
Avoided Maintenance Costs for New Levees	++
Avoided Upgrade Costs for Existing Levees	++

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Costs

The project budget focuses on the purchase of conservation easements over 225 acres of land in the Santa Clara River floodplain. These purchases are assumed to occur in three transactions. Each transaction will require approximately $10,000 in closing costs, for a total of $30,000. The remaining $4,477,500 will go directly towards the purchase of conservation easements. These costs will accrue upon closing, anticipated in calendar year 2012. The present value in 2009 dollars of the project costs is $3,786,300.

The "Without Project" Baseline

The 116-mile Santa Clara River is the last major river still in a relatively natural state in Southern California. The river has a watershed area of 1,626 square miles, which covers portions of Ventura and Los Angeles Counties. The river originates on the northern slope of the San Gabriel Mountains in Los Angeles County, traverses Ventura County, and flows into the Pacific Ocean between the Cities of San Buenaventura (Ventura) and Oxnard (LAWQCB 2010a).

Municipalities within the Watershed include Santa Clarita in the Los Angeles County portion, and Fillmore and Santa Paula in the Ventura County portion. The Cities of Oxnard and Ventura are located in the Ventura Coastal Watershed which includes the areas downstream of the Santa Clara River (RWQCB, 2010b). The Cities of Oxnard and Ventura receive some of their supply from groundwater recharge in the Oxnard Forebay, which is recharged from the Santa Clara River by the United Water Conservation District. All of the cities in the Watershed utilize groundwater supplies to some extent. The Cities of Fillmore and Santa Paula rely on groundwater for the vast majority of their supplies.

The broad Santa Clara River bed and its adjacent floodplain allow water to move slowly and often stand for long periods of time. This floodplain performs in a relatively natural function because of limited channelization and provides attenuation of flooding events, natural pollution buffering, recharge of groundwater, and habitat for many species.

Rapid population growth and economic development in the Watershed has led development to encroach into portions of the floodplain. When this happens, levees are built and the river is channelized to reduce flooding risks to the development. This often leads to greater water velocities and more serious and extensive flooding downstream. Furthermore, new levees, levee maintenance, and upgrading of downstream levees all come at substantial cost.

Currently, the cities of Fillmore and Santa Paula are annexing property along the Santa Clara River and expanding. If urbanization in the floodplain continues and this project is not implemented, it is anticipated that 80 percent of the Santa Clara River floodplain will be developed. Without the project, impervious area in the floodplain will increase as a result of development, which will result in reduced groundwater recharge. In addition, increased development in the floodplain will likely require a significant portion of the river to be channelized with levees (as has already occurred in the Fillmore area). This will result in increases in flow velocity, which will reduce the total time water flows in the river. This short flow period will in turn reduce the amount of water that is percolated into the groundwater basin. Instead, this water will be lost as runoff to the ocean.

Water Supply Benefits

The primary water supply benefit of this project is the avoided loss of groundwater recharge that will occur if the floodplain is developed. The benefit described below will only be partially realized through this project (225 acres out of a targeted 3,280 that need to be purchased for full benefit realization). However, funding this project will provide the initial steps necessary to begin realizing these benefits, and those benefits will increase as the NFPP continues beyond the purchase of easements for the first 225 acres.

Avoided Loss of Groundwater Recharge

The broad Santa Clara River bed and its adjacent floodplain allow water to move slowly and often stand for long periods of time. Some of this water percolates into the soil, eventually reaching the groundwater in the Santa Clara River Valley. The groundwater basin consists of a number of geologically isolated sub-basins (Mound, Santa Paula, Fillmore, Piru, and Santa Clara East), each of which have distinctive hydrologic characteristics (California Department of Water Resources, 2006 and 2010).

Percolation rates in the floodplain can be anywhere from 0 to 4 feet per day depending on the degree of existing levee confinement and river channelization, location within a particular groundwater basin, and climatological factors, among others. In general, however, if levees are constructed, they will reduce the riverbed width and remove large areas of floodplain, further reducing groundwater recharge potential. The loss in percolation will depend on the location along the river and the extent that the river already has been confined by existing levees in that location. In addition, development will increase the amount of impervious area in the floodplain, thus reducing opportunity for percolation. Additionally, groundwater and surface water used for agricultural irrigation often results in additional groundwater recharge. Broad floodplains with large areas of irrigated agriculture increase the area of contact between water and the ground, thereby permitting percolation into groundwater basins. Ensuring that agriculture continues in the floodplain assures groundwater recharge that would otherwise be lost to urbanization. This will avoid loss of groundwater supply for use by agricultural and municipal uses in the Watershed. As noted in the "Without Project" Baseline discussion, all of the cities in the Watershed utilize groundwater supplies for some or all of their water supply.

Distribution of Project Benefits and Identification of Beneficiaries

The NFPP will provide water supply benefits to a variety of stakeholders as summarized in Table 25. Most of the municipalities in the Watershed rely on groundwater for the vast majority of their water supply. Although the specific hydrology of each sub-basin determines the extent that percolation affects recharge, all current water users will benefit from avoiding the loss of groundwater recharge. Beneficiary cities specifically include the cities of Oxnard, Ventura, Santa Paula, and Fillmore. In addition to these cities, farmers in the Watershed will also benefit from maintaining groundwater availability. VCWPD and the Farm Bureau are participating in the NFPP with TNC in part due to these water supply benefits.

Table 25: Project Beneficiaries Summary

Local	Regional	Statewide
City of Fillmore City of Santa Paula	Ventura County Watershed Protection District	
City of Ventura	Ventura County Farm Bureau	
City of Oxnard	United Water Conservation District	–

Project Benefits Timeline Description

This project is assumed to be executed over an 18-month timeframe from July 2011 through December 2012. It is anticipated that easements will be acquired in calendar year 2012. The benefits described in this attachment will be only partially realized with the 225 acre easement purchase and will require 3,280 acres of remaining undeveloped floodplain to be purchased to fully realize these qualitative water supply benefits.

Potential Adverse Effects from the Project

This project is exempt under CEQA under two categories: Acquisition for Wildlife Conservation Purposes (Class 13) and Open Space Contracts of Easements (Class 17). There are no adverse effects anticipated from this project.

Summary of Findings

The main water supply benefit from this project is the qualitative assessment of the avoided loss of groundwater recharge (see Table 26). Without the project, impervious area in the floodplain will increase as a result of urbanization, which will result in reduced groundwater recharge. In addition, increased development in the floodplain will likely require a significant portion of the river to be channelized with levees. This will result in increases in flow velocity, which will reduce the total the time water flows in the river. This short flow period will in turn reduce the amount of water that is percolated into the groundwater basin. The groundwater recharge benefit described above is to maintain the current groundwater availability as compared to reduced groundwater availability with the anticipated development of the Santa Clara River floodplain. Under that anticipated without-project future, a gradual erosion of groundwater availability will occur over time with new development.

Table 26: Qualitative Benefits Summary – Water Supply

Benefit	Qualitative Indicator*
Avoided Loss of Groundwater Recharge	+

+ = Likely to increase net benefits relative to quantified estimates.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, there are no quantitative or monetized benefits calculated and the cost calculations represent an accurate sum of money necessary to purchase easements over 225 acres. There are no identifiable biases or uncertainties in the water supply benefits or the costs of this project because both the size of the easements and the costs are quite accurate.

References

California Department of Water Resources. 2010. “Hydrologic Regions of California: South Coast.” Available: http://www.water.ca.gov/groundwater/bulletin118/south_coast.cfm.

California Department of Water Resources. 2006. "Santa Clara River Valley Groundwater Basin, Oxnard Subbasin." California's Groundwater Bulletin 118 Update 1/20/06. *Available:* http://www.water.ca.gov/pubs/groundwater/bulletin_118/basindescriptions/4-4.02.pdf. Accessed December 2010.

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Table 11- Annual Cost of Project
(All costs should be in 2009 Dollars)
Project: The Nature Conservancy Natural Floodplain Protection Program (SC-7)

	Initial Costs	Operations and Maintenance Costs (1)					Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009	$0						$0	1.000	$0
2010	$0						$0	0.943	$0
2011	$0						$0	0.890	$0
2012	$4,507,500						$4,507,500	0.840	$3,786,300
2013	$0						$0	0.792	$0
2014	$0						$0	0.747	$0
Project Life	$4,507,500								
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$3,786,300

Comments:

Ojai Valley Land Conservancy
Ojai Meadows Ecosystem Restoration Final Phase (V-5)

Summary

The Ojai Valley Land Conservancy (OVLC) Ojai Meadows Ecosystem Restoration Final Phase restores upland and transitional habitats to prevent soil erosion and sedimentation into recently-restored wetlands and establishes appropriate plant density in those wetland habitats at the Ojai Meadows Preserve (OMP). The overall OMP is designed to resolve flooding problems on State Highway 33 and at Nordhoff High School, while providing a variety of ancillary benefits. The initial phase modified the site topography to direct stormwater from three adjacent sites into a variety of wetland channels and pools in order to prevent flooding on nearby properties, allow stormwater contaminants to break down through natural processes, promote water infiltration to recharge groundwater, and provide habitat for plants, amphibians, birds, and other wildlife.

The Final Phase of the OMP Ecosystem Restoration will add 41 acres of upland and transitional habitats to complement the wetland features and place the wetlands in an ecological context that is self-sustaining. This phase is critical, not just to finish the project, but also to protect the flood control, groundwater recharge, and stormwater contaminant filtration benefits produced by the initial phase. After earth moving was completed, the area outside of the wetland habitat was colonized by invasive weed species with shallow root systems that are not particularly effective at holding soil in place. If this problem is not addressed, sedimentation of the riparian areas and wetlands will require periodic dredging and habitat rehabilitation in order to maintain the benefits already realized through the initial phase. This project will restore the weed-infested upland areas of OMP by planting 20 acres of native grasslands and valley oak savannah vegetation, 20 acres of coast live oak woodlands, and 1 acre of coastal sage scrub in habitat transition areas. This phase will also include additional riparian plantings, as necessary, in the wetlands areas along the drainage channels to establish appropriate plant densities. The restored native oak and grassland habitats are important to the ecological functioning of the site because they reduce sedimentation issues in the wetlands; provide the vertical structure and hunting areas necessary for sustainable bird populations; and improve the aesthetic, recreational, and educational value of the OMP.

A summary of all benefits and costs of the project is provided in Table 27. Project costs and water supply benefits are discussed in the remainder of this attachment.

Table 27: Benefit-Cost Analysis Overview

	Present Value
Costs – Total Capital and Operations and Maintenance	$514,327
Monetizable Benefits	
Flood Control Benefits	
Avoided Dredging to Maintain Flood Control Improvements	$342,244
Total Monetizable Benefits	$342,244
Qualitative Benefit or Cost	**Qualitative Indicator***
Water Supply Benefits	
Maintained and Enhanced Groundwater Recharge	+
Water Quality and Other Benefits	
Maintained Wetland and Riparian Habitat	+
Enhanced Upland Habitat	++
Potential Special Status Species Habitat	+
Increased Greenhouse Gas Sequestration	+
Reduced Invasive Weed Infestations	++
Improved Stormwater Quality	+
Enhanced Recreational Opportunities	+

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease net benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

Costs

The project budget is focused on restoring the upland ecosystems in the OMP. This involves mechanically and manually managing weeds, additional plantings in the area of the existing riparian vegetation to achieve appropriate plant density, distributing native grass and wildflower seeds on site, and planting approximately 10,000 native trees and shrubs. The majority of these costs (more than 77 percent) are for implementation. These costs will be spread out over an implementation period from July 2011 through May 2014. The total present value of these costs is $514,327.

The "Without Project" Baseline

The OMP Ecosystem Restoration is located between the community of Meiners Oaks and the City of Ojai, in the Ventura River Watershed (Watershed). This coastal Watershed is located in the northwestern portion of Ventura County and drains a 228-square mile area, roughly half of which is on U.S. Forest Service land. Land use in the Watershed is predominantly open space, with residential, agricultural, and industrial use along the mainstem of the river. The surface water in the Watershed generally flows in a southerly direction to an estuary located at the mouth of the Ventura River.

The Upper Ventura River Groundwater Basin (Basin) is composed of alluvial aquifers, which are quickly recharged during wet periods and, conversely, are rapidly depleted during periods of drought (DWR, 2004). The Basin is experiencing declining storage and may result in a number of existing wells going dry during a prolonged drought. (Kear, 2010)

The initial phase of the OMP Ecosystem Restoration eliminated frequent flooding on the adjacent section of State Highway 33 and Nordhoff High School by modifying the topography of the site to direct stormwater from three adjacent sites into a variety of wetland channels and pools. These wetlands also provide stormwater quality improvements, new habitats, and groundwater recharge benefits. However, because the upland areas had to be disturbed during the grading activities, the OMP has been infested with weeds that do not effectively hold the soil in place. If this situation is not resolved, many of the benefits of the initial phase will be degraded or negated entirely. Without the Final Phase of the OMP Ecosystem Restoration, maintaining these benefits in the face of sedimentation from upland areas would require periodic dredging and restoration of the wetlands at significant cost or all benefits, including groundwater recharge, will be lost.

Water Supply Benefits

The primary water supply benefit of this project is maintenance and enhancement of groundwater recharge through the retention of stormwater in wetlands and riparian areas where this water can infiltrate into the Upper Ventura River Groundwater Basin.

Maintained and Enhanced Groundwater Recharge

The riparian corridors and wetlands that were constructed in the initial phase of the OMP Ecosystem Restoration hold water on the property in pools that encourage infiltration into the groundwater table. Full capacity of temporary storage from the ponds associated with the constructed wetlands is estimated to be about 5 acre-feet (AF). A portion of this temporary storage infiltrates to the Basin. Additional water infiltrates through the wet meadow on the site. This enhanced groundwater recharge is important for stabilizing groundwater levels locally and supporting the ability of municipal and agricultural users in the area to withstand groundwater level drawdowns during prolonged droughts.

The Final Phase of the OMP Ecosystem Restoration will maintain and enhance groundwater recharge benefits in two ways. First, the planting of upland areas with native grasses, trees, and shrubs will slow the flow of water over the surface and lead to higher infiltration through the porous upland soils. This will allow even more water to infiltrate into the groundwater aquifer, especially in events at or near the capacity of the wetland areas. Second, the infiltration benefits provided by the initial phase of the OMP Ecosystem Restoration are directly related to the capacity of the pools and wetlands.

If the upland areas are not restored, sedimentation will gradually reduce the capacity of these pools and wetlands and will reduce on-site groundwater infiltration. Revegetation of the upland areas will hold the soil in place, reduce or eliminate sedimentation, and ensure that the benefits provided by the initial phase of the OMP Ecosystem Restoration will continue to be realized in the future. Maintenance of these benefits without the ecological restoration under the Final Phase of the OMP Ecosystem Restoration would require periodic dredging and restoration of the riparian corridors and wetland areas. These avoided costs, which are reported in Attachment 9, are not included here to avoid double counting the benefits associated with avoiding dredging and restoring the wetlands and riparian corridors.

Distribution of Project Benefits and Identification of Beneficiaries

Table 28 shows the range of water supply beneficiaries from the project. The OVLC owns the OMP. Maintenance and enhancement of groundwater recharge benefits all communities reliant on Ojai Valley groundwater.

Table 28: Project Beneficiaries Summary

Local	Regional	Statewide
Ojai Valley Land Conservancy		
All Communities Reliant on Ojai Valley Groundwater	–	–

Project Benefits Timeline Description

This project will be executed over a 36-month time frame from June 2011 through May 2014. Habitat restoration is an intensive activity that must consider the life cycle of both weed species and the native vegetation to ensure an efficaciously restored habitat. The project will first focus on managing weeds, removing non-native woody species, and managing the weed seedbank through mechanical and manual techniques.

Application of native grass and wildflower seeds will begin in 2012 depending upon weed management success. This will be followed by planting of the potted plant stock to establish the desired habitats. Together, these plantings will establish vegetation that will provide erosion control and prevent sedimentation of the restored wetlands. Weed management will continue throughout the project's assumed 50-year lifetime and likely for many years beyond. Most project benefits will be realized very quickly after native plants begin to recolonize the area. However, some benefits will be realized over time as the plants mature and the habitat becomes fully established.

Potential Adverse Effects from the Project

A Final Initial Study/Mitigated Negative Declaration (IS/MND) was prepared to comply with CEQA (Rincon Consultants, Inc., 2007). The IS/MND found that there are no adverse effects anticipated from this project.

Summary of Findings

The water supply benefit from this project is the maintenance and enhancement of groundwater recharge as found on Table 29. The groundwater recharge benefits provided through the initial phase can only be maintained if sedimentation of the constructed wetlands and riparian corridors is prevented. Furthermore, planting native vegetation will slow overland water movement and allow more precipitation to infiltrate through soils upland of the wetlands, thus enhancing groundwater recharge.

Table 29: Qualitative Benefits Summary – Water Supply

Benefit	Qualitative Indicator*
Maintained and Enhanced Groundwater Recharge	+

Note:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. For instance, the project costs may be lesser or greater than the estimate used as is shown in Table 30.

Table 30: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Project Costs	U	The present value calculation of project costs is a function of the timing of project implementation and a number of other factors and conditions. Changes in these variables will change the estimate of costs.

Notes:

* Direction and magnitude of effect on net benefits:

+ = Likely to increase net benefits relative to quantified estimates.
++ = Likely to increase net benefits significantly.
– = Likely to decrease benefits.
– – = Likely to decrease net benefits significantly.
U = Uncertain, could be + or –.

References

California's Groundwater. Bulletin 118. 2004. Department of Water Resources.

Presentation to Ventura River Watershed Council: Upper and Lower Ventura River Groundwater Basins: Groundwater budget and Approach for a Groundwater Management Plan. 2010. Daniel B. Stephens and Associates, Inc., Kear, Jordan.

Table 11- Annual Cost of Project (All costs should be in 2009 Dollars) Project: OVLC Ojai Meadows Ecosystem Restoration Final Phase Project (V-5)								
	Initial Costs	Operations and Maintenance Costs [1]					Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total Cost From Table 7 (row (i), column(d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (f)	Discount Factor	Discounted Costs(g) x (h)
2009	$0						$0	1.000	$0
2010	$0						$0	0.943	$0
2011	$121,841						$121,841	0.890	$108,438
2012	$208,871						$208,871	0.840	$175,452
2013	$208,871						$208,871	0.792	$165,426
2014	$87,030						$87,030	0.747	$65,011
Project Life	$626,613								
Total Present Value of Discounted Costs (Sum of Column (i)) Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									$514,327
Comments:									

(1) The incremental change in O&M costs attributable to the project.